University of Alberta

A Developmental Study Concerning the Design and Implementation of Constructivist Learning Environments

by

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Abstract

This dissertation is an interpretive research study using developmental research to design a constructivist learning environment for a Grade 8 Social Studies classroom in which students researched information, wrote scripts, acted in and directed short video clips of events in Canadian history.

The key elements are as follows: a constructivist research methodology (Guba and Lincoln, 1989); a developmental research framework based on Linjse's definition of a "cyclical process of theoretical reflection, conceptual analysis, small-scale curriculum development, and classroom research of the interaction of teaching-learning processes" (1995, p. 192); design activities guided by Akker's admonition that developmental research must be grounded in a systematic effort to apply a theoretical rationale for design choices as well as ensuring that systematic documentation, analysis and reflection activities occur that describe the process in depth; and a design component, the R2D2 instructional design model (Willis & Wright, 2000) that emphasizes reflective, recursive and participatory design.

The theoretical background for the design was based on ideas surrounding constructivist learning theory and instantiated by identifying nine elements that seemed to be important elements in a constructivist environment and guidelines for designing constructivist learning that matched each element.

Reported students' experiences centered around themes of construction and reorganization of knowledge; tool mediation; group work and multiple perspectives. Barriers in the classroom concerned lack of time (centered on curriculum demands and scheduling) and difficulties with technology. Facilitators included students' positive attitudes and perception of fun; the teacher's positive attitude; and alternative modes of learning allowing success for non-traditional students.

The experience of role overload and balancing the tension between design and research were identified as problems for a single researcher attempting this type of research.

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CHAPTER 1: INTRODUCTION

In 2002 through 2004, I conducted an interpretive research study to explore the use of developmental research in the design and implementation of a constructivist learning environment in a school setting. My rationale for conducting this research project was based on three reasons: my wish to improve education; my desire to create; and, my interest in learning theory.

One reason I wanted to conduct this research involved my lifelong quest to change things. As a teen of the late 60s, entering university in 1970, I was imbued with the spirit of change that permeated those times. My involvement with education as a teacher and computer consultant left me with a desire to work for change that would benefit the majority of students uninspired by the educational system as it now functions.

My second reason for pursuing this research involves my wish to create. In developmental research, the researcher is involved in the design and development of something (a piece of software, a learning environment, a curriculum), yet at the same time is studying all the factors which surround the development and deployment of the artifact (i.e. an artifact is defined by the Oxford English Reference dictionary as a product of human art and workmanship). The result of design could be many things: a design document, a software program, a scaffolding tool or a curriculum document. To me, the word artifact implies something constructed, yet does not have the commercial connotations of a word like product, thus a better choice. Thus, I can create, as well as conduct, research.

My final reason involves my interest in learning theory. As a young child, I loved to learn. I was a voracious reader, devouring everything from early science fiction, National Geographic magazines, Greek mythology, to whatever was readily available in the house or our limited school library. When I became a parent, I found it very hard to understand why my children did not love to read and learn the way I did as a child. When I worked as a computer consultant, I encountered many adults and children who were disenchanted about learning as a result of their prior experiences. When my husband struggled through a competency based mechanic's course and expressed his frustration at a course which did not meet his learning needs, I tried to analyze why so many people were so frustrated and negative towards learning when I had embraced it so joyously. For me, reading and schoolwork challenged my heart and my imagination. But for others, reading and school learning were sterile and unrewarding activities, pursued only because they were mandatory.

When I encountered the ideas surrounding constructivism – ideas such as the need for active, engaged learners working in authentic contexts to explore meaningful goals – these ideas resonated with my past experiences as a teacher and learner. Since I believed that constructivist learning theory could provide a framework for the development of more effective learning environments, I decided to study constructivist learning processes in the classroom with the goal of designing aids or tools that could be used as scaffolds for learning.

What is Constructivism?

Before continuing to introduce this study, it is useful to consider the meaning of some key terms. The term constructivism will be defined first. According to Jonassen (1991), "constructivism, founded on Kantian beliefs, claims that reality is constructed by the knower based upon mental activity" (p. 10). This definition is iterated by an online encyclopedia, which states: "Constructivism views all of our knowledge as 'constructed', because it does not reflect any external 'transcendent' realities; it is contingent on convention, human perception, and social experience" (Wikipedia, 2006).

While constructivism is often considered to be an epistemological position concerning the nature of reality, as defined above, in this dissertation I am also concerned with its use as a pedagogical learning theory. I think the definition below captures my understanding of this term:

> Constructivism is a philosophy of learning founded on the premise that, by reflecting on our experiences, we construct our own understanding of the world we live in. Each of us generates our own "rules" and "mental models," which we use to make sense of our experiences. Learning, therefore, is simply the process of adjusting our mental models to accommodate new experiences. The basic distinction in constructivism is that while behaviorists view knowledge as something that happens in response to external factors, and cognitivists view knowledge as abstract symbolic representations inside the learner's head, constructivists view knowledge as constructed internally by each individual. That is, no knowledge can be transferred intact from one individual to another. Each

> individual colors and shapes the knowledge to fit within their frame of reference. (Buell, n.d.)

It is important to realize that defining constructivism can be challenging because people often confuse ideas about reality (the ontological view) with methods for instantiating constructivist ideas in the classroom (the pedagogical view). Chapter 2 will discuss the pedagogical aspects of constructivism in much greater detail.

What is Developmental Research?

Lijnse defines developmental research as a "cyclical process of theoretical reflection, conceptual analysis, small-scale curriculum development, and classroom research of the interaction of teaching-learning processes" (1995, p. 192), while Seels and Richey (1994) define developmental research as "the systematic study of designing, developing and evaluating instructional programs, processes, and products" (p. 127). Van den Akker (2000) explains that developmental research needs to be grounded in a systematic effort to apply a theoretical rationale for design choices as well as ensuring that systematic documentation, analysis and reflection activities occur that describe the process in depth.

Although it may be possible to conduct developmental research using the stance of detached observer, in this study I have situated myself as a co-participant within the process, espousing the constructivist research stance discussed by Guba and Lincoln (1989, 1994).

Why Choose Developmental Research?

Several researchers (Reeves, 2000; Reeves, Herrington, & Oliver, 2005) have stated that previous research in instructional technology has generally been quite poor and have suggested that developmental research may provide a mechanism for overcoming the poor quality of previous research by providing a focus for "use-inspired basic research" which addresses "complex problems in real contexts in collaboration with practitioners" (Reeves, 2000, p.7); integrates "known and hypothetical design principles with technological affordances to render plausible solutions to these complex problems" (Reeves, 2000, p. 7); and conducts "rigorous and reflective inquiry to test and refine innovative learning environments as well as to define new design principles" (Reeves, 2000, p. 8).

A Canadian literature review (Bracewell, Breuleux, Laferriere, Benoit & Abdous, 1998) concerning the use of online resources and tools in the K-12 classroom recommended that policy and research initiatives should be guided by a reflective approach to teaching (teachers-as-researchers), a collaborative learning/research approach, and a design experiment approach. (Van den Akker (2000) includes design experiments as another type of developmental research.)

Various experts have called for the use of developmental research. Why use this type of research and not another? Van den Akker (2000) explains:

> Development research is often initiated for complex, innovative tasks for which only very few validated principles are available to structure and support the design and development activities. . . . The aim is not to elaborate and implement complete interventions but to come to (successive) prototypes that increasingly meet the innovative aspirations and requirements. The process is often cyclic or spiral: analysis, design, evaluation, and revision activities are iterated until a satisfying balance between ideals and realization has been achieved. (p. 7)

Kozma (2000) states that in order to support learning (a) "we need to embed ourselves in the contexts of our client base" by understanding "their latest theories, research and issues of practice in whatever context domain we chose to work" (p. 13); (b) the focus needs to shift from design of instruction to design of learning environments as well as to provide the tools and resources necessary for these environments; and, (c) since the design of learning materials is the core of instructional technology, more research needs to be carried out on how media, by enabling or constraining, shapes design. Developmental research affords these opportunities for design as well as research while interacting in the real-world constraints of the classroom. By its theoretical and cyclic nature, this type of research allows researcher and participants to reflect critically about practice and the process of design.

Significance of the Study

Today's complex world requires many skills from school graduates. According to Sawyer (2006), students need "a deep conceptual understanding of complex concepts, and the ability to work with them creatively". They also need to "be able to critically evaluate what they read, . . . express themselves clearly", and "understand scientific and mathematical thinking". He goes on to state that "they need to learn integrated and usable knowledge rather than the sets of compartmentalized and decontextualized facts" common to the school experiences of many students today (Sawyer, 2006, p. 2).

Students also need skills in collaboration, team building and negotiation. They need to be able to locate, interpret and evaluate information. They need to be innovative problem solvers and integrators. They need deep knowledge of a subject area, and, as mentioned above, they need to know how subjects are interrelated. Yet, research in cognition has suggested that students are not making much of an effort to understand or retain information that they encounter in school. An interesting analysis by Scardamalia and Bereiter (1996) lists the factors in the traditional school setting that discourage the acquisition of deep understanding and higher-level skills in students:

- Arbitrary standards and procedures in classrooms emphasize surface details;
- Schools' emphasis on turning out a product causes students to meet production requirements in a minimum of time and effort;
- Oversimplification of texts (for readability or summarization) renders these texts unintelligible;
- Limited time for reflection coupled with the need to compete with other students when responding to questions results in economical strategies such as copy-delete or knowledge-telling;
- Emphasis on reproduction of disconnected facts (often as a result of high stakes testing) as opposed to acquiring an in-depth interpretive understanding of a subject area leads students to focus on strategies of rote memorization rather than understanding;
- Curricula are overloaded with major topics introduced every 2 – 6 weeks;
- There is a lack of connection between previous learning and schoolwork;
- Students are subjected to busywork activities designed to keep them occupied that are not supportive of meaning construction; and,
- Powerlessness and low probability of success leads many students to save their mental effort for other activities where they can be more successful.

Scardamalia and Bereiter (1996) suggest that all these factors combine to produce students who tend to conserve the "mental effort that might otherwise go into understanding" (p. 154). They also state that "expending effort when one has little control or chance for success may simply increase frustration. A more adaptive approach would reserve efforts for spheres of activity where one has more control over outcomes" (p. 154).

To address these problems, Ministries of Education in both Canada and the United States (Saskatchewan Education, 1984; Alberta Learning, 1999; U.S. Department of Education, 2001) are calling for graduates who can "reason, solve problems, apply knowledge, and write and communicate effectively" (U.S. Department of Education, 2001). Various professional groups such as the National Council for Teachers of Mathematics (NCTM, 1989) and the National Council for the Social Studies (NCSS, 1994) have developed positions that endorse the use of constructivist learning as a means to engage students in critical thinking, decision making and problem solving.

However, attempts to implement constructivist learning in classrooms have been problematic as well. Perkins (1991, 1999) discusses three difficulties that have arisen as a result of the implementation of constructivist ideas in the classroom – cognitive complexity, task management and "buying in". Constructivist learning environments are often quite complex as they are designed to mirror authentic problems or simulate real events. While, in traditional environments, students often manage to carry naïve models of understanding unchanged throughout school, in a constructivist environment, students' mental models are often challenged in the richer environment of phenomenaria or construction kits. (*Phenomenaria* are areas for presenting, observing and manipulating phenomena. An example of this is a simulation such as Sim City. *Construction kits* are similar to phenomenaria, except that they are less closely tied to natural phenomena. Examples of construction kits may include scientific apparatus used in learning laboratories such as LEGO Robotics or science probes, learning logs, and authoring tools such as word processors.)

According to Perkins (1991), activities in a constructivist environment engender a very high cognitive demand, as students compare and contrast their ideas with more sophisticated models. A second difficulty arises from the nature of constructivism itself –

if students have more control over their learning, they also are required to manage it by themselves and this can be a difficult proposition for the student used to having the environment managed by the teacher. The third difficulty arises when the student does not perceive the value of self-directed learning, and therefore, does not "buy in" to this method of learning. A student who demands "Why don't you just tell me what you want me to know?" is often motivated by a desire to learn things in the most efficient way possible and does not understand why the search for knowledge, although more time consuming, results in a deeper understanding.

These problems aside, Perkins suggests that:

> Troublesome knowledge of various kinds invites constructivist responses to fit the difficulties – not one standard constructivist fix. If a particular approach does not solve the problem, try another-more structured, less structured, more discovery oriented, less discovery oriented, whatever works. (1999, p. 11)

This suggests the need for research that is closely aligned to the situation of use – an ideal candidate for developmental research.

While there are several frameworks suggested as guidelines for the development of constructivist learning environments (e.g., Grabinger, 1996; Hannafin, Land, & Oliver, 1999; Jonassen, 1999), these frameworks are typically instantiated at a higher education level. More research is needed which is specifically geared to designing learning environments in the K-12 sector. While many studies have been carried out concerning constructivism in science and mathematics education, the research involving constructivism in the social studies classroom is quite sparse. For example, in a combined search of ERIC and PsycINFO (February 26, 2001), there were 56 articles combining constructivism and social studies compared to 1388 combining mathematics or science with constructivism. When the above-mentioned search was combined with research as a keyword, the number of social studies articles dropped to two. For these reasons, I believe that developmental research into designing constructivist learning environments and supports for social studies will make a useful contribution to knowledge in the area.

Considerations in Design

Early work in instructional technology applied behaviorist learning principles to the design of instruction in a design approach termed instructional systems design or ISD

(Banathy, 1968; Gagne, 1962; Glaser, 1965). According to behaviorist learning principles, topics can be broken down into basic components (atomized), sequenced from simple to complex and transmitted to learners in small steps. Learning is decontextualized, and learners are expected to assimilate this knowledge and retain it through practice. The advent of cognitive science and its interdisciplinary emphasis on how learning occurs led to more elaborated theories such as Gagne's Events of Instruction (Gagne, 1985) and resulted in models such as Dick and Carey's Systematic Design of Instruction (1985). Even though these newer approaches to design did incorporate a fuller emphasis on mental processes, they were still based on the supposition that it is possible to transmit knowledge from one person to another, with the student coming to an understanding that mirrors an external reality present for all. This view of instruction has been termed "instructivist" (Rieber, 1992) or "objectivist" (Bednar, Cunningham, Duffy, & Perry, 1991; Jonassen, 1991).

A newer model for design, suggested by Bannan-Ritland (2003), is the Integrative Learning Design Framework (ILD). This ILD model incorporates features from a number of disciplines including ISD, Usage-centered design, Roger's innovation development and product design to produce a comprehensive systems-based model for design. Stages of this framework include Informed Exploration, Enactment, Evaluation: Local Impact and Evaluation: Broader Impact. Concerning the use of this framework, she states:

> It is important to note that the ILD process is not intended to be a description of a single study in which an intervention is designed in a relatively short space of time and then tested and disseminated. Rather, it is meant to provide a program-level perspective. (Bannan-Ritland, 2003, p. 21)

Many Instructional Design (ID) practitioners have begun to explore alternative learning strategies based on a different approach to learning: constructivism (Bednar et al., 1991; Choi & Hannafin, 1995; Duffy & Cunningham, 1996; Jonassen, 1991). As a result of these constructivist influences, various instructional designers have suggested that it is no longer desirable to carry out instructional design using the linear, top-down ISD process and have suggested the need to design learning environments (also called constructivist learning environments, open learning environments or student centered learning environments) designed to support learners in the active construction of knowledge (Duffy & Cunningham, 1996; Hannafin et al., 1999; Jonassen, 1991, 1999;

Moonen, 2000; Schwartz, Lin, Brophy, & Bransford, 1999; Willis, 1998, 2000, Willis & Wright, 2000; Wilson, 1996).

The Design Framework

As a constructivist designer, I chose to use the Reflective, Recursive, Design and Development model (R2D2) developed by Willis and Wright (2000) as my instructional design model. Because its process of reflection, recursion, and development, as well as its emphasis on participation, was so in tune with the cyclical nature of developmental research, I chose to follow this model in my design efforts. One important element of the R2D2 model is its emphasis on participatory design. Participatory design (sometimes called cooperative or collaborative design) is the inclusion of teachers and other educational representatives on a development team where they help to set design goals, plan, and test prototypes.

My study had two components, a research component based on an emergent type of research termed developmental research (Lijnse, 1995; Richey, Klein, & Nelson 2004; Richey & Nelson, 1996; Van den Akker, 2000) and a design component emphasizing reflective, recursive and participatory design (Schuler & Namoika, 1993; Shrader, Williams, Lachance-Whitcomb, Finn, & Gomez, 2001; Willis & Wright, 2000).

This design and development process was tentative and iterative (Van den Akker, 2000; Richey & Nelson, 1996) and involved a series of steps consisting of goal setting, content and context analysis, production design, and participant checking via student and teacher interviews. As insights arose from this practice, they were used as a basis for revisions in the next cycle (iteration). This developmental research process resulted in the creation of an artifact based on an event in Canadian history for Grade 8 social studies.

Research Questions

In the previous section, I discussed how several authors (Lijnse, 1995; Seels & Richey, 1994; Van den Akker, 2000) defined developmental research. Their definitions coincided on several elements – they emphasized the theoretical basis for design, the systematic study of the process of design, development and evaluation, the importance of context, and the need for systematic documentation, analysis, and reflection activities.

Following their guidelines, I formulated the following research questions:

What is the process involved in the design, development, and implementation of an effective constructivist learning environment in the designated classroom? This question addressed the need for a developmental study to comprehensively document the process of the research, beginning with the theoretical underpinnings of the design and describing the implementation and formative evaluation of the project in action.

What can be said about the learning experiences of the students as they work in the prototype learning environment? According to Rourke (2005), "Naturalistic researchers are concerned with local meanings, specific understandings, and the particular interpretations formulated by specific actors in specific events" (p. 9). This question was included to tease out those local meanings, specific understandings and interpretations of the students and to identify what they said about their experiences in the project.

What are the barriers or facilitators in the study classroom that impinge on student-centered learning? This question examined the context of the classroom in order to identify factors that affected the project.

While the previous three questions examined the data collected during the project, the following three questions are more reflective in nature, based as they are on my experiences as a developmental researcher:

What can be said about my experience as a designer/researcher occurring as a result of the developmental research process?

What can be said about the design model used during the developmental research process?

What can be said about developmental research as a process for design, development and implementation in the classroom?

Outline of this Dissertation

In chapter 2 I will examine the theoretical traditions of constructivist design. After conducting a literature review to find instances of exemplary constructivist design, I compiled a list of nine characteristics of constructivist learners based on a synthesis of the aforementioned literature and matched these characteristics with guidelines for the design of constructivist learning environments. I will also discuss the literature concerning developmental research and constructivist instructional design.

In chapter 3 I will discuss my philosophical stance as a researcher, drawing on descriptions of the constructivist research paradigm from Guba and Lincoln (1994). I will then discuss the research project in depth, with reference to participants, data collection and analysis. I will also reiterate the research questions. The chapter concludes with a discussion about how to ensure quality in qualitative research, my values, the measures I took to ensure that ethical considerations were met, and the limitations and delimitations of the study.

In chapter 4 I will describe how the project began in spring 2002 as a volunteer partnership in a constructivist classroom. I will also examine in what ways the project was based on the constructivist framework developed in chapter 2 and discuss evaluations from both the teacher and myself.

In chapters 5 and 6 I will examine the two years of the research project in detail, discussing what the project looked like in each of its iterations in order to answer my first research question: *What is the process involved in the design, development, and implementation of an effective constructivist learning environment?*

In chapter 5 I will discuss the design and implementation of the project during the 2002-03 school year. I will write about the design decisions, relate how the project was based on the constructivist framework from chapter 2, give details about the formative evaluation of the project, and illustrate how the project was revised. In chapter 6 I will examine the same topics for the 2003-04 school year.

In chapter 7 I will consider two of my research questions: *What can be said about the learning experiences of the students as they work in the prototype learning environment? What are the barriers or facilitators in the study classroom that impinge on student-centered learning?* I will profile the student perspectives by comparing a number of recurring themes discovered through analysis of the interviews and observation logs. I will also discuss the existence of a number of factors that acted as barriers to the successful completion of the project as well as those elements that influenced the project in a positive way.

In chapter 8 I will discuss my reflections concerning my remaining research questions: *What can be said about my experience as a designer/researcher occurring as a result of the developmental research process? What can be said about the design model used during the developmental research process? What can be said about developmental research as a process for design, development and implementation in the classroom?* Lastly, I will make recommendations for further research.

CHAPTER 2: LITERATURE REVIEW

I believe we need to change the way we promote knowledge acquisition in schools. Research indicates that there are effective ways of learning, based on constructivist principles, which can be used to improve the learning experiences of students (Bransford, Brown, & Cocking, 2000; Brown & Campione, 1996; Resnick, 1987). In this chapter I will present research studies that discuss how constructivist learning environments can be designed and implemented. I will also develop a framework of nine elements that I will use as my guidelines for developing constructivist learning environments.

Wilson (1996) defines constructivist learning environments as "a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem-solving activities" (p. 5). Creating and using a viable constructivist learning environment potentially touches on many areas. For the purposes of this study, I limited this search to the areas I perceived as most salient to the creation and use of constructivist learning environments. First, I will trace the historical development of constructivist learning environments by examining Piaget's research into knowledge construction and Vygotsky's sociocultural theories of mind. Next, I will discuss the characteristics of constructivist learners and the guidelines arising from these characteristics that can be used in the design of constructivist learning environments. Following that, I will explore three exemplary developmental research projects that have incorporated technological scaffolding as well as instantiated constructivist design principles. Next, I will examine constructivist projects designed for use in social studies. Following that, I will profile the role of the teacher in a constructivist learning environment. I will also look at developmental research as a means for conducting this study. Finally, I will look at constructivist instructional design through the lens of participatory design in order to examine the activities of teachers and designers in that process.

Antecedents for the design of constructivist learning environments

Constructivist learning theory is often divided into two types: 1) individual cognitive constructivism developed from Piaget's research into knowledge construction in children as well as research in cognitive psychology, and, 2) social constructivism based on Vygotsky's sociocultural theory of mind. Piaget (1955, 1976) talked of the child as an active constructor of knowledge and discussed accommodation and assimilation as the mechanisms we use to constantly structure and update this knowledge. Vygotsky (1930/1978) discussed the role of culture and language as mediators of thought. He also suggested that social interaction is the process that forms and develops the mind as we know it.

Piaget

Piagetian constructivists, often termed cognitive constructivists, believe that knowledge is developed and shaped in the mind of individual learners through their active manipulation and interaction with the environment (Piaget, 1955). Learners organize events, classify objects and develop understandings of the world. In the process, they develop schemes (later termed schemata); cognitive structures used to organize and make sense of what they are experiencing. The mechanisms of assimilation, accommodation, equilibration and disequilibration are used to describe the mental processes by which learners develop and refine these schemes or organizing mental structures. Through assimilation, learners attempt to explain how things work or behave by relating them to previously experienced objects or ideas. The process of assimilation allows for the growth of schemes by allowing learners to add depth to their ideas. Accommodation occurs when learners realize that their mental structures do not have sufficient explanatory power to explain what they perceive. This causes disequilibrium, and in order to regain a feeling of equilibrium, learners will engage in a reflective process termed accommodation in order to arrive at a deeper understanding.

Von Glasersfeld (1988) explains how these mechanisms work within Piaget's theory of schemes. An infant who has constructed a scheme about rattles (recognizes graspable item with rounded end, associates sound with shaking, expects similar items to make similar noises) will often pick up and shake other items with similar characteristics such as a spoon (graspable item with rounded end), in an attempt to assimilate it to his/her rattling scheme. Shaking the spoon does not result in what the child expects (no sound) and this causes perturbation (Piaget called it disequilibrium). The child, through accommodation, will now recognize the spoon as a non-rattle. Von Glasersfeld continues by saying that, if the spoon happens to hit the table, the child may, through accommodation, develop a different scheme – the spoon-banging scheme.

He continues:

> The learning theory that emerges from Piaget's work can be summarized by saying that cognitive change and *learning* take place when a scheme, instead of producing the expected result, leads to perturbation, and perturbation, in turn, leads to accommodation that establishes a new equilibrium. (Von Glasersfeld, 1988, p. 7)

Vygotsky

Vygotsky's theory posits that the social environment is instrumental in cognitive development. He stated:

> Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level: first *between* people (*interpsychological*), and then *inside* the child (*intrapsychological*). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All higher functions originate as actual relations between human individuals. (Vygotsky, 1930/1978, p. 57)

Vygotsky also placed great emphasis on the use of tools, both material and psychological, as a way to mediate between people and their environment. He used Marx's idea about how tools mediate human labor activity and extended that idea to examine how sign systems mediate human social processes and thinking.

> Psychological tools are artificial formations. By their nature they are social, not organic or individual. They are directed toward the mastery or control of behavioral processes . . . just as technical means are directed toward the control of processes of nature. . . . By being included in the process of behavior, the psychological tool alters the entire flow and structure of mental functions. It does this by determining the structure of a new instrumental act just as a technical tool alters the process of a natural adaptation by determining the form of labor operations. (Vygotsky, 1981, p. 137)

Another of Vygotsky's ideas that has had an important influence on educational thought involves the zone of proximal development (ZPD). While Piaget theorized that children moved through identifiable stages in the development of cognitive structures, Vygotsky was more concerned with the performance of children when supported by more knowledgeable peers or adults. While criticizing the use of intelligence tests, Vygotsky developed the idea of the zone of proximal development (ZPD) which he defined as "*the distance between the actual developmental level as determined by independent problem solving, and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers*" (Vygotsky, 1930/1978, p. 86). He suggested that the proper activity of teachers was to assess the learner's ZPD and provide support in that area as that was where improvement would occur.

Bruner defined the process of assisting students in their zone of proximal development as scaffolding (Wood, Bruner, & Ross, 1976). Just as a scaffold provides a temporary support during the building process that is later removed when the structure is more secure, the more knowledgeable learner (teacher or peer) will provide supports for the learner to assist them in their own knowledge construction. As the less knowledgeable learner becomes more confident, the scaffolding activities are faded until the learner is able to accomplish the activity unaided. Sociocultural constructivists, following the teachings of Vygotsky, put more emphasis on the cultural and historical bases of learning and emphasize the social interaction necessary in the learning process.

Brown et al. (1993) suggested that active agents within the ZPD can include "people, adults and children, with varying degrees of expertise, but can also include artifacts such as books, videos, wall displays, scientific equipment and a computer environment intended to support intentional learning" (p. 191). Therefore, we see that various technologies can be used to scaffold learners as long as they are used appropriately as supports for the active construction of knowledge.

Research on Learning

The emphasis on cognitive or sociocultural constructivism led to differences in focus for learning research. Many of the concepts first developed in cognitive psychology research have been appropriated to explain mechanisms for cognitive constructivism. Cognitive constructivists use the concepts of schema theory, based on initial Piagetian thought and expanded by Rumelhart (1980), and mental models (Derry, 1996) to explain the workings of the active mind.

Researchers working in the individual cognitive tradition have conducted research into topics such as:

- Metacognition (defined as deliberate, planful, and goal-directed thinking applied to one's thoughts to accomplish cognitive tasks) and learning strategies (Brown, 1980; 1992).
- Discovery learning (Bruner, 1961/2006)
- Intentional knowledge construction (Scardamalia, Bereiter, McLean, Swallow, & Woodruff, 1989; Scardamalia & Bereiter, 1996).
- Problems of inert knowledge (Bransford, Franks, Vye, & Sherwood, 1989; Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Whitehead, 1929). Inert knowledge refers to previously learned knowledge that is not spontaneously applied to a relevant problem but is available for recall when prompted. Alfred Whitehead (1929) first referred to the condition of inert knowledge when he noted that knowledge might be context specific. In other words, we may learn something in one context but be unable to apply it to a relevant problem in another.
- The differences between expert and novice problem solvers (Chi, Feltovich, & Glaser, 1981; Bransford et al., 2000).
- Difficulties of learners in ill-structured domains (Spiro, Feltovich, Jacobson, & Coulson, 1991; Jacobson, & Archodidou, 2000; Shin, Jonassen, & McGee, 2003; Wijekumar & Jonassen, 2007). Ill-structured domains, according to Prestine (1993) are characterized by: (1) "ill-defined and messy" problems, (2) "elusive and uncertain" solutions in which "routinized or a priori identified knowledge structures and processes are either lacking or insufficient", and, (3) a context which is "complex, ambiguous, and in constant flux" (p. 196).

Researchers working from the sociocultural focus have conducted research into topics such as:

- Anchored instruction (Cognition and Technology Group at Vanderbilt, 1990).
- Situated cognition and cognitive apprenticeship (Brown et al., 1989; Herrington & Oliver, 2000; Lave & Wenger, 1991).
- Distributed learning (Hutchins, 1996).
- Communities of learners (Brown & Campione, 1990, 1994, 1996).
- Communities of practice (Wenger, 1998)

The common thread uniting these studies is the desire to understand learning. Many of the theoretical understandings about the design of constructivist learning environments have arisen from the insights of these foundational studies.

Elements of Constructivism

Various researchers and theorists have discussed what they consider the salient features of constructivism. Before an effective learning environment can be devised, it is important to examine what constructivism reveals about knowledge and the learner. In this section, I will identify and group these characteristics of constructivist learning and then develop a framework based on these characteristics to aid in the specification and construction of an effective learning environment.

The nine elements of constructivist learning I have identified are as follows:

1) *Learning involves the active construction and reorganization of knowledge* (Boethel & Dimock, 1999; Brown & Campione, 1994; Duffy & Cunningham, 1996; Ewell, 1997; Fosnot, 1984; Grabinger and Dunlap, 1995; Jonassen, Peck & Wilson, 1998; Koschmann, 1996; Lebow, 1995; Piaget, 1955, 1976; Resnick, 1987; Wilson & Myers, 1999).
2) *The learner defines meaning* (Bruner, 1996; Ewell, 1997; Hannafin et al., 1999; Jonassen et al., 1998).
3) *Prior learning is important* (Boethel & Dimock, 1999; Brooks & Brooks, 1993; Hannafin & Land, 2000; Piaget, 1955).
4) *Learning is mediated by artifacts, tools and signs* (Duffy & Cunningham, 1996; John-Steiner & Mahn, 1996; Vygotsky, 1978; Wilson & Myers, 2000).

5) *Learning is a collaborative, social-dialogical activity* (Brown & Campione, 1990; Duffy & Cunningham, 1996; Grabinger & Dunlap, 1995; Jonassen et al., 1998).
6) *Learning is reflective* (Brown & Campione, 1996; Duffy & Cunningham, 1996; Jonassen et al., 1998).
7) *Learning involves multiple perspectives* (Boethel & Dimock, 1999; Duffy & Cunningham, 1996; Jonassen, 1991; Lebow, 1995).
8) *Knowledge is anchored in the context of the learning activity* (Brown, Collins, & Duguid, 1989; Duffy & Cunningham, 1996; Jonassen et al., 1998).
9) *Learning is internally controlled* (Lebow, 1995, Scardamalia et al., 1989).

I will now explain these nine elements in greater detail.

Learning involves the active construction and reorganization of knowledge

Grabinger and Dunlap (1995) state "knowledge is not a product to be accumulated but an active and evolving process in which the learner attempts to make sense out of the world" (p. 7). Boethel and Dimock (1999), building on Piaget's ideas, suggest that learning is a process of accommodation, assimilation, or rejection to construct new conceptual structures, meaningful representations, or new mental models. They also state that learners combine action and reflection to build meaning. Learners are viewed as active constructors rather than passive recipients of knowledge (Brown & Campione, 1994) and learning is a process of knowledge construction, not of knowledge recording or absorption (Resnick, 1989; Duffy & Cunningham, 1996; Jonassen et al., 1998).

Bruner (1961/2006) also reinforces the need for active construction. In discussing discovery learning, he says:

> It is my hunch that it is only through the exercise of problem solving and the effort of discovery that one learns the working heuristic of discovery, and the more one has practice, the more likely is one to generalize what one has learned into a style of problem solving or inquiry that serves for any kind of task one may encounter. (p. 64)

The learner defines meaning (but not all meaning is created equally)

Each individual constructs their own meanings by establishing and reworking patterns, relationships, and connections (Ewell, 1997; Hannafin et al., 1999). Meaning is in the mind of the knower since individuals have a unique set of experiences that have contributed to produce their beliefs (Jonassen et al., 1998). As Jonassen says, “We all conceive of the external reality somewhat differently, based on our unique set of experiences with the world and our beliefs about them” (1991, p. 10). However, not all meanings are equally accepted. Both Von Glasersfeld (1989) and Bruner (1996) discuss the fact that these constructed meanings are still subject to verification. Bruner states, "The ‘rightness’ of particular interpretations, while dependent on perspective, also reflects rules of evidence, consistency and coherence. Not everything goes. There are inherent criteria of rightness, and the possibility of alternative interpretations does not license all of them equally" (p.14).

Prior learning is important

Learning is knowledge-dependent; we use our current knowledge to construct new knowledge. “Each of us makes sense of our world by synthesizing new experiences into what we have previously come to understand" (Brooks & Brooks, 1993, p. 4). Learners take in information, process it to fit their existing personal frameworks and beliefs and build new understandings (Boethel & Dimock, 1999; Land & Hannafin, 2000; Piaget, 1955).

Bransford et al. (2000) state that “children come to the classroom with preconceptions about how the world works. If their initial understanding is not engaged, they may fail to grasp the new concepts and information that are taught, or they may learn them for purposes of a test but revert to their preconceptions outside the classroom” (p. 14-15).

Learning is mediated

Learning is mediated by artifacts, tools and signs (Duffy & Cunningham, 1996; Vygotsky, 1930/1978; Wilson & Myers, 2000). “Higher mental functions are, by definition, culturally mediated. They involve not a direct action on the world but an indirect one, one that takes a bit of material matter used previously and incorporates it as an aspect of action” (Cole & Wertsch, 1996, p. 252). According to John-Steiner and Mahn, “semiotic mediation is key to all aspects of knowledge development” (1996, p.

192). These authors continue by enumerating the various semiotic tools – language, systems of counting, mnemonics, diagrams, maps, paintbrushes, computers, calendars and symbol systems, among others – which mediate between learners and their knowledge constructions. As Duffy and Cunningham (1996) explain, these semiotic tools have been invented within a culture to address some felt need but in being used, they also transform their culture.

Learning is a collaborative, social-dialogical activity

"Learners are distributed, multi-dimensional participants in a sociocultural process" (Duffy & Cunningham, 1996, p. 180; Vygotsky, 1930/1978). Meaning making is a process of negotiation among the participants through dialogues or conversations (Grabinger & Dunlap, 1995; Jonassen et al., 1998). Dialogue among students helps them to organize and clarify their ideas and notice how their theories differ from others. Questions posed during the collaboration process can lead to the formation of much richer conceptualizations, as students elaborate on or make changes to their original ideas based on feedback from others.

Learning is reflective

Knowledge building requires articulation, expression or representation of what is learned (Jonassen et al., 1998). An environment that facilitates "effort after meaning, comprehension monitoring and an atmosphere of wondering and querying knowledge" encourages the deep learning of concepts (Brown & Campione, 1996, p. 317).

Learning involves multiple perspectives

Knowledge is constructed in multiple ways through a variety of tools, resources, experiences and contexts (Boethel & Dimock, 1999). Multiple representations avoid oversimplification and represent the complexity of the real world (Duffy & Cunningham, 1996; Jonassen, 1991; Lebow, 1995).

Knowledge is anchored in the context of the learning activity

Knowledge is context dependent, so learning should occur in the authentic context to which it is relevant (Brown et al., 1989; Duffy & Cunningham, 1996). "Information about the context is part of the knowledge that is constructed by the learner in order to explain or make sense of the phenomenon" (Jonassen et. al., 1999, p. 3); however, the classroom represents an impoverished environment (Resnick, 1987) when contrasted with the rich opportunities for enculturation and authentic activity found in a traditional work apprenticeship (Lave & Wenger, 1991). Remedies for this problem have been suggested by the idea of "cognitive apprenticeship" (Collins, Brown, & Newman, 1989) such as Brown and Campione's apprentice learners or Scardamalia and Bereiter's intentional learners. In the traditional work apprenticeship, learners are exposed to the culture and ways of knowing of a particular workplace (learning to be a doctor or an anthropologist) and learn to apply their learning meaningfully in that context. Similarly, in the classroom the authentic activity is learning how to learn and becoming adept at the ways of acquiring and integrating knowledge.

Learning is internally controlled

Lebow (1995) identified ownership, relevance, personal autonomy and self-regulation (including metacognition) as important requirements for learning. Students in control of the learning process who perceive that their own personal learning goals were being met exhibit "intrinsic motivation, meaningful learning, self-esteem and a variety of other factors relevant to the initiation and regulation of intentional learning" (p. 320).

> Successful learners are found to use a variety of cognitive strategies and self-management procedures to pursue knowledge related goals, to relate new knowledge to old, to monitor their understanding, to infer unstated information, and to review, organize and reconsider their knowledge. (Scardamalia, et al, 1989, p. 53)

Bransford et al. (2000) state that "a metacognitive approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them" (p. 18).

After identifying these nine elements of constructivist learning and learners, I next looked to the literature to examine what was known about how to design constructivist learning environments. As I looked at each of the nine elements, I tried to match recommendations from the literature about how to design these environments. The following section will discuss the resulting framework, which was used as a guide throughout the design activities carried out for this dissertation project. I will refer to this framework again in chapters 4, 5, and 6 as I explain my rationale for project design.

Guidelines for designing constructivist learning environments

In Table 1 below, I constructed a framework that specifies numerous guidelines for the design of constructivist learning environments. The framework consists of two parts; on the left side are the learning characteristics identified above, on the right side are the design guidelines pertaining to that characteristic as identified in the literature.

Element of Constructivism	**Guidelines for design of learning environment**
Learning involves the active construction and reorganization of knowledge (Boethel & Dimock, 1999; Brown & Campione, 1994; Bruner, 1961/2006; Duffy & Cunningham, 1996; Ewell, 1997; Fosnot, 1984; Grabinger & Dunlap, 1995; Jonassen et al., 1998; Koschmann, 1996; Lebow, 1995; Piaget, 1955; Resnick, 1987; Wilson & Myers, 1999)	• Emphasize knowledge construction instead of knowledge reproduction (Jonassen, 1994). • Enable context- and content- dependent knowledge construction. (Jonassen, 1994) • Design the learning environment to support and challenge the learner's thinking (Savery & Duffy, 1995) • Students gain experience with knowledge construction by determining topics, methods for how to learn and solve problems. Role of teacher is to facilitate this process (Honebein, 1996) • Emphasize student-centered instruction (Driscoll, 1994) • Learning is an active process of constructing rather than acquiring knowledge; instruction is a process of supporting that construction rather than communicating knowledge (Duffy & Cunningham, 1996)
The learner defines meaning (but not all meaning is created equally) (Bruner, 1996; Ewell, 1997; Hannafin et al., 1999; Jonassen et al., 1998)	
Prior learning is important in knowledge construction (Bransford et al., 2000; Boethel & Dimock, 1999; Brooks & Brooks, 1993; Hannafin & Land, 2000; Piaget, 1955)	• Uncover and work from students' existing understandings in order to capitalize on student interests and structure learning problems that challenge and build on existing knowledge and experience (Boethel & Dimock, 1999).

Element of Constructivism	Guidelines for design of learning environment
Learning is mediated by artifacts, tools & signs (Duffy & Cunningham, 1996; John-Steiner & Mahn, 1996; Vygotsky, 1930/1978; Wilson & Myers, 2000)	• Produce cognitive tools (knowledge construction tools) (Jonassen, 1999). • Provide coaching by the teacher at critical times, and scaffolding and fading of teacher support (Herrington & Oliver, 2000; Jonassen, 1999). • Provide access to expert performances and modeling of processes (Herrington & Oliver, 2000). • Use technology to scaffold higher mental processes (Hannafin et al., 1999).
Learning is a collaborative, social-dialogical activity (Brown & Campione, 1990; Duffy & Cunningham, 1996; Grabinger & Dunlap, 1995; Jonassen et al., 1998)	• Produce conversation and collaboration tools (Jonassen, 1999). • Support collaborative construction of knowledge (Herrington & Oliver, 2000). • Support collaborative construction of knowledge through social negotiation, not competition among learners for recognition. (Jonassen, 1994). • Embed learning in social experience (Honebein, 1996). • Provide for social negotiation as an integral part of learning (Driscoll, 1994). • Promote articulation to enable tacit knowledge to be made explicit (Herrington & Oliver, 2000).
Learning is reflective (Brown & Campione, 1996; Duffy & Cunningham, 1996; Jonassen et al., 1998)	• Provide opportunity for and support reflection on both the content learned and the learning process (Jonassen, 1994; Savery & Duffy, 1996; Scardamalia et al, 1989). • Promote reflection to enable abstractions to be formed (Herrington & Oliver, 2000). • Encourage reflexivity and metacognitive self-awareness about learning process (Driscoll, 1994; Honebein, 1996).
Learning involves multiple perspectives (Duffy & Cunningham, 1996; Boethel & Dimock, 1999; Jonassen, 1991; Lebow, 1995)	• Provide multiple roles & perspectives (Herrington & Oliver, 2000) • Provide multiple representations of reality (Jonassen, 1994). • Provide experience in and appreciation for multiple perspectives – evaluate alternative solutions for problems (Honebein, 1996) • Juxtapose instructional content and include access to multiple modes of representation (Honebein, 1996). • Include related cases (Jonassen, 1999). • Encourage testing ideas against alternative views and alternative contexts (Savery & Duffy, 1996). • Encourage multiple passes through information (Scardamalia et al, 1989).

Element of Constructivism	**Guidelines for design of learning environment**
Knowledge is anchored in the context of the learning activity. (Brown et al., 1989; Duffy & Cunningham, 1996; Jonassen et al., 1998)	• Design the task and the learning environment to reflect the complexity of the environment they should be able to function in at the end of learning (Savery & Duffy, 1996). • Embed learning in realistic and relevant contexts-complexity built in (Honebein, 1996). • Provide authentic context that reflects the way knowledge will be used in real life (Driscoll, 1994; Herrington & Oliver, 2000; Oliver, 2000; Savery & Duffy, 1996) • Emphasize authentic tasks in a meaningful context rather than abstract instruction out of context. (Jonassen, 1994). • Support the learner rather than simplify the dilemma (real problems ¬ ZPD) (Barab & Duffy, 2000). • Provide learning environments such as real-world settings or case-based learning instead of predetermined instruction. (Jonassen, 1994). • Anchor all learning activities to a larger task or problem-learner must see relevance to problem (Savery & Duffy, 1996).
Learning is internally controlled (Bransford et al., 2000; Lebow, 1995, Scardamalia et al., 1989)	• Support the learner in developing ownership for the overall problem or task and give the learner ownership of the process used to develop a solution (Lebow, 1995; Savery & Duffy, 1996) • Encourage ownership and voice in learning process (Honebein, 1996) • Support intentionality (Oliver, 2000)

Table 1: Elements of constructivism with guidelines for design

The Management of Constructivist Classrooms

In the introduction to *The Cambridge Handbook of the Learning Sciences*, Sawyer (2006) discusses the traditional version of schooling, termed instructionism, as being characterized as:

> Knowledge is a collection of *facts* about the world and *procedures* for how to solve problems [italics in original]. . . .
>
> The goal of schooling is to get these facts and procedures into the student's head. People are considered to be educated when they possess a large collection of these facts and procedures.
>
> Teachers know these facts and procedures, and their job is to transmit them to students.
>
> Simpler facts and procedures should be learned first, followed by progressively more complex facts and procedures. The definition of "simplicity" and "complexity" and the proper sequencing of material were determined either by

> teachers, by textbook authors, or by asking expert adults like mathematicians, scientists, or historians – not by studying how children actually learn.
>
> The way to determine the success of schooling is to test students to see how many of these facts and procedures they have acquired. (p. 1)

From the characteristics of constructivist learning listed above, it is evident that constructivism demands a very different classroom environment from that of the traditional classroom as discussed by Sawyer (2006) above or by Scardamalia and Bereiter (1996) in chapter 1. Sandholtz, Ringstaff and Dwyer (1997) suggest that technology may act as a catalyst for change since it provides a change in context that suggests alternative ways of operating, "It can drive a shift from a traditional instructional approach toward a more eclectic set of learning activities that include knowledge-building situations for students" (p. 48). Boethel and Dimock (1999) detail the following ideas about technology in constructivist classrooms:

> According to Bagley and Hunter (1992), students become empowered and spend more time in active construction of knowledge when using technology. Technology provides more resources for student use in problem solving, thinking and reflection. Students spend more time collaborating with other students and communicating with teachers when developing technology projects. Means, Blando, Olson, Middleton, Morocco, Remz, and Zorfass (1993) note that many reformers now view technology as "a means of supporting goals related to increased student involvement with complex, authentic tasks and new organizational structures within classrooms and schools." (p. 1)

If these assertions are correct, then it appears that technology can provide useful support in constructivist learning environments. Researchers in many subject areas have designed technological scaffolds to be used in these environments. I will now examine several innovations that have been designed to act as either tools within or self-contained learning environments.

Tools, Scaffolds or Programs for Constructivist Learning

Utilizing constructivist methods in the classroom involves enormous behavior changes from conventional practice for both learners and teachers. Research tells us that any innovation which is complex, requires institutional support, involves behavior change, and is not perceived as being a significant improvement, is difficult to implement (Fullan, 2001; Rogers, 1995). Constructivism meets all of these criteria. There is some research indicating that technological tools that act as scaffolds for learning are beneficial in constructivist classrooms (Jonassen, 1999).

From the numerous examples available, I have chosen three examples that, in my mind, typify development research. These projects have a strong theory base, have undergone several iterations of the research cycle, and have made a positive impact on student achievement. Two of these projects are generic, Fostering a Community of Learners (FCL) and Computer Supported Intentional Learning Environments (CSILE), in that they could be used at any level for any subject, while the third, The Adventures of Jasper Woodbury, began with elementary mathematics problem solving and includes complex trip planning, algebra, geometry, statistics and business plans.

Fostering a Community of Learners (Brown and Campione)

Fostering a Community of Learners (FCL) is an integrated reading/science/critical-thinking program where students are encouraged to conduct research in depth on the large organizing concepts in a domain (as an example, the ecological concept of changing populations). Elements of the program include: reciprocal teaching; research seminar for older students and those familiar with reciprocal teaching; guided writing; consultation with outside experts via class visits and email; crosstalk; distributed expertise (majoring); collaborative learning using the jigsaw approach; guided assessment; reflection; and discourse. The FCL program also has a computer support component that provides resources for student research, allows student to consult with external experts via email and assists students to locate relevant resources for their studies.

FCL is designed to "promote the critical thinking and reflection skills underlying multiple forms of higher literacy" (Brown & Campione, 1996, p. 290). It is a system of interacting activities resulting in an active and reflective learning environment with three key parts:

- Students engage in independent and group research on some aspect of a topic of inquiry, mastery of which is ultimately the responsibility of all members of the class.
- This requires that they share their expertise with their classmates.

> - This sharing is further motivated by some consequential task or activity (Scardamalia, Bereiter, & Fillion, 1981) that demands that all students have learned about all aspects of the joint topic (p. 292-293).

An important component of the FCL program is reciprocal teaching (RT). Through reciprocal teaching, students have numerous opportunities to practice the metacognitive structures of questioning, clarifying, summarizing and predicting. According to Brown and Campione (1996), these structures were not chosen randomly; they are "excellent cognitive monitoring devices" to determine whether understanding is occurring as well as providing a structure for discussion. Reciprocal teaching (RT) begins as the teacher models the structures with a small group of students. A passage is read, the teacher asks questions about the sentence, summarizes the main idea and asks for predictions about what might come next. Gradually, she begins to distribute this function amongst the students by appointing a student leader who must ask the next questions about main idea, summary and prediction. When students have difficulty framing questions, the teacher scaffolds the child by guiding their question construction. As children become more practiced at these structures, the teacher's role becomes less prominent until she is no longer needed to help in the process. Students in the FCL classroom will often call for RT sessions with other students in their topic groups in order to gain their insights about material with which they are having difficulty.

Upper level students familiar with reciprocal teaching created the research seminar (RS). In RS, the four RT structures are replaced by more powerful comprehension-extending activities. Adults model and students practice the use of analogy, causal explanations, warrants for evidence, different points of view and prediction in the process of determining the information to be shared with their classmates.

Another intriguing component of FCL is crosstalk. Crosstalk was initiated by students to help frame their questions and check on their progress before production of their final work product. Crosstalk is a whole class conference where individual groups talk informally about what they have discovered in their research. They may present information or bring up problems that they are having. During these sessions, other students can ask questions about what has been presented or brainstorm ideas to help those who are having a problem. Class questions improve the clarity of the final presentations and validate or challenge student ideas about a topic.

The overarching goal of FCL is to foster a community of research practice where students serve as cognitive apprentices to the adults and students in their class. Students feel a sense of ownership in the project and the choice of its direction. The classroom encourages a "community of discourse pervaded by knowledge seeking and inquiry processes" (Brown & Campione, 1996, p. 321). The collaborative setting fosters overt reasoning, so that many role models of thinking emerge. In FCL classrooms, students read for a purpose: to communicate, write, teach, persuade and understand. As Brown and Campione state: "We argue that with repeated experience explaining and arguing, justifying claims with evidence, etc., students will eventually come to adopt these critical thinking strategies as part of their personal repertoire of ways of knowing" (1990, p. 123).

Principles That Characterize Communities of Learners

Lee Shulman (building on a framework devised by Bruner) states:

> At least six distinct principles appear to characterize effective and substantive learning in the community of learners model. . . . Authentic and enduring learning occurs when:
>
> > The subject-matter content to be learned is *generative*, essential and pivotal to the discipline or interdiscipline under study, and can yield new understandings and/or serve as the basis for future learning of content, processes and dispositions.
> >
> > The learner is an *active* agent in the process, not passive, an audience, a client or a collector. Learning becomes more active through experimentation and inquiry, as well as through writing, dialogue and questioning.
> >
> > The learner not only behaves and thinks, but can "go meta" – that is, can *reflectively* turn around on his/her own thought and action and analyze how and why their thinking achieved certain ends or failed to achieve others. Metacognition – consciousness of how and why one is learning particular things in particular ways – is the key to deep learning.
> >
> > There is *collaboration* among learners. They can work together in ways that scaffold and support each other's learning, and in ways that supplement each other's knowledge. Collaboration is a marriage of insufficiencies, not exclusively cooperation in a particular form of social interaction. Moreover, there are difficult intellectual challenges that are nearly impossible to accomplish alone, but are more readily addressed in the company of others.

> Teachers and students share a *passion* for the material, are emotionally committed to the ideas, processes and activities and see the work as connected to present and future goals.
>
> The process of activity, reflection and collaboration are supported, legitimated and nurtured within a *community* or *culture* that values such experiences and creates many opportunities for them to occur and be accomplished with success and pleasure. Such communities create participant structures which reduce the labor-intensity of the activities needed to engage in the most daunting practices that lead to teaching and learning. Classrooms and schools that are characterized by activity, reflection and collaboration in learning communities are inherently uncertain, complex and demanding. Both learning and teaching in such settings entail high levels of risk and unpredictability for the participants. Both students and teachers require a school and community culture that supports, scaffolds and rewards those levels of risk-taking and invention characteristic of these new ways of learning for understanding and commitment. (Shulman, 2004, p. 493-4)

Computer Supported Intentional Learning Environment (CSILE)

The CSILE project was developed to provide an enriched learning environment where the focus is on the intentional construction of knowledge by students (Scardamalia, et. al., 1989). A CSILE classroom typically consists of up to eight networked computers connected to a file server. The server contains a student-generated database that encourages students to communicate their ideas and questions, explore and compare their perspectives, and reflect on their communal understanding. Students build on others' contributions as a means of constructing and clarifying a joint understanding of concepts. CSILE databases contain both text and graphics, which have been produced by students and are searchable by keywords.

The original CSILE database has evolved into a software program, Knowledge Forum, designed to scaffold student inquiry. In an article summarizing ten years of research on CSILE, Scardamalia and Bereiter (2006) discuss six themes that underlie the shift from students as inquirers to students as members of a knowledge-building community. These themes and their explanations are as follows:

- **Knowledge advancement as a community rather than individual achievement.** This theme refers to the fact that students can advance the knowledge of their classroom community through their efforts to devise theories and models to explain phenomena they are researching.

- **Knowledge advancement as idea improvement rather than as progress toward true or warranted belief.** This theme allows the students to provide explanations that work iteratively toward ever more sophisticated constructions of their understanding.
- **Knowledge *of* in contrast to knowledge *about*.** This theme discusses the fact that students need more than just factual or declarative knowledge (knowledge *about*). Knowledge *of* also includes procedural knowledge, the knowledge that is activated when that knowledge is needed in the course of an action. They posit that the best way to acquire this type of knowledge is through problem solving, where the two types of knowledge can be integrated meaningfully.
- **Discourse as collaborative problem solving rather than as argumentation.** This theme refers to the need for classrooms to work collaboratively to increase understanding.
- **Constructive use of authoritative information.** This theme gives credence to traditional sources of information (e.g. Books) but also legitimizes student's firsthand experiences as a source of knowledge.
- **Understanding as an emergent.** This theme comes from a dynamic systems perspective and suggests that ideas can interact with other ideas to form new, more complex understandings and that students in the classroom can be a part of this idea formation. (Scardamalia & Bereiter, 2006)

When students adopt the attitudes towards knowledge exemplified in these themes, they are able to participate in a classroom actively working towards knowledge construction. As one teacher in a Knowledge Forum classroom stated: "We see knowledge-transforming discourse evolving out of students (1) engaging in scientific theory-making and debate; (2) coming to see themselves as contributors to knowledge, and (3) developing a collective approach to knowledge building" (Caswell & Bielaczyc, 2001, p. 301). In chapter 1, I discussed the ways that students could minimize learning while still meeting the demands of their school tasks (Scardamalia & Bereiter, 1996).

Student attitudes in these knowledge-constructing classrooms contrast markedly with the attitudes of students where knowledge construction is not the main goal.

Both FCL (Brown & Campione, 1996) and CSILE (Scardamalia, et. al., 1989) have in common the idea of the consequential task, the public exposition of knowledge. This is reminiscent of the "oeuvre" discussed by Bruner:

> The benefits of "externalizing" such joint products into oeuvres have too long been overlooked. First on the list, obviously, is that collective oeuvres produce and sustain group solidarity. They help *make* a community, and communities of mutual learners are no exception. But just as important, they promote a sense of the division of labor that goes into producing a product: Todd is our real computer wonk, Jeff's terrific at making graphics, Alic and David are our "word geniuses," Maddalena is fantastic at explaining things that puzzle some of the rest of us. . . .
>
> Works and works-in-progress create *shared* and *negotiable* ways of thinking in a group. . . . Externalization produces a *record* of our mental efforts, one that is "outside us" rather than vaguely "in memory". . . . "It" embodies our thoughts and intentions in a form more accessible to reflective efforts. The process of thought and its product become interwoven. (Bruner, 1996, p. 22-3)

I think that this idea, to create works that make thinking public, is an important feature of a constructivist learning environment, one that requires students to think deeply and restructure knowledge in meaningful ways.

The Adventures of Jasper Woodbury Problem Solving Series

The Jasper series (Cognition and Technology Group at Vanderbilt, 1996) was designed to teach problem solving. Students watch dramatized video vignettes that present complex, realistic problems. In order to solve the challenges, students must be able to break a large complex problem into sub-problems and solve the sub-problems using math skills. The adventures require students to work collaboratively to solve the authentic problems by formulating strategies, finding relevant data embedded within the vignettes and constructing mathematical arguments. Most of the problems have numerous solutions, some of which are more optimal. This involves the students in a process of reflection and discussion on mathematical topics.

These three programs share a set of assumptions about learning: the importance of (1) deep disciplinary knowledge; (2) authentic problems (from students' perspectives); (3) feedback and reflection; and, (4) social structures that encourage learning. There is an emphasis on the importance of sustained thinking about authentic problems that form the basis of extended in-depth inquiry. These three programs have also reported improvements in both basic skill and higher level thinking outcomes measurements.

While there are numerous examples of technologically mediated constructivist programs in science and mathematics, it is harder to find examples of technologically mediated projects in social studies. The next section will discuss two projects from this subject area.

Tools, Scaffolds or Programs for Social Studies

The following two projects, developed to facilitate student learning in social studies, both utilize a hypermedia framework. The first project concerns knowledge creation as middle school students work as hypermedia designers (Lehrer, 1993, Erickson & Lehrer, 1998) while the Decision Point! project (Brush & Saye, 2000) uses a problem-based learning format to focus on civil rights issues at the high school level. As with the projects discussed previously, these projects were designed to instantiate constructivist theoretical principles.

Students as Hypermedia Designers

Erickson and Lehrer conducted an on-going design experiment where students designed hypermedia documents that were used as tools for learning by their fellow students. Students learned research and communications skills in the context of designing documents for social studies. The authors reported on various aspects of their study in a number of articles (Carver, Lehrer, Connell, & Erickson, 1992; Erickson & Lehrer, 1998; Lehrer, 1993; Lehrer, 1994). I would like to discuss two of the articles that touch on knowledge construction and student design skills.

The first article (Lehrer, 1993) discussed the process of knowledge construction by profiling the activities of two small groups of students as they worked through the process of designing a set of resources to help their fellow students learn more about the civil war. One group was composed of above-average students, while the other group was composed of low ability students. While there were initial differences between the two groups on measures such as task orientation, Lehrer commented, "the most striking finding was the degree of student involvement and engagement" (p. 209). At the end of the study, a comparison was made between the other classroom students who had studied the civil war in the traditional classroom manner and the study participants. Differences between the two groups on knowledge outcomes were not significant at that time. However, the study participants showed marked differences in their attitudes towards history, and in their long-term retention of information about the topic. When an independent researcher tested both groups one year later, the classroom students remembered almost nothing about the content, while the student designers displayed elaborate concepts and ideas that they had extended to other areas of history. Students in the design class now viewed history as a process of interpreting the past from different perspectives, while, to their fellow classmates, historians were collectors of truth. To summarize: "the design approach lead [*sic*] to knowledge that was richer, better connected, and more applicable to subsequent learning and events" (p. 221).

The second article (Erickson & Lehrer, 1998) reports on the inquiry process within the classroom as students decide what they need to research for their hypermedia documents. Teachers in a whole class setting provided support through the design of skill templates to scaffold students' inquiry skills and initiated daily critiques to model the process of question design. As well as teacher assessment, students were encouraged to critique their peers, thereby identifying areas of misunderstanding throughout the design process.

This study examined the changes in student standards for question quality and design of documents. Questions evolved from those that were easily answered to those that created an opportunity for knowledge construction. Quality documents evolved from those that were text intensive or eye-catching to those that demonstrated clarity of communication and consideration of audience, as well as those documents that were organized in a way that made sense for navigation. This study identified the student skills necessary for knowledge construction and design, which included project management skills, research skills, organization and representation skills, presentation skills and reflection skills. It also provided a useful description of how teachers might facilitate the knowledge construction project through their daily classroom critiques.

Decision Point!

This study documents the introduction of a multimedia-enhanced problem-centered history unit about civil rights (Brush & Saye, 2000). According to the authors, the unit was developed to foster civic competency. Since citizens must be able to make informed decisions about ill-structured social problems, students need to develop skills in civic reasoning such as the "ability to form persuasive and dialectical arguments that demonstrate a genuine, informed consideration of alternatives" (Saye & Brush, 1999, p. 3). To this end, the authors developed a multimedia database consisting of information in primary and secondary source materials pertaining to the civil rights movement after the death of Martin Luther King. Students were given six 90-minute class periods to access and process the information concerning five different civil rights strategies actually used by different groups, come up with strategies to continue the movement and present their solutions to class. Students were first grouped in five data-gathering groups where they researched the five historical strategies used in the civil rights movement: legal system; nonviolent desegregation; nonviolent-voting rights; black power SNCC; and, black power-abandoning integration. They then formed four decision-making groups with one representative from each of the five data-gathering groups to come up with a solution to the question: What strategies should be pursued in 1968 to continue the struggle for a more just, equal United States society? Their solutions to this problem were presented to the class on the final day.

The project leaders stated, "the purpose of this study was to explore the issues involved in implementing a student-centered unit in a typical social studies classroom" (Brush & Saye, 2000, p. 82). The study was carried out in a classroom with students who had never been involved in student-centered learning, who had no training or experience in group work and with a teacher who described her teaching style as teacher-oriented and structured.

This case study is very useful to consider when pondering the design of constructivist learning environments since it discusses many of the difficulties that may arise in the process of changing from a teacher-led to a student-centered learning environment. The discussion identified the following student issues: difficulty dealing with the lack of structure; difficulty dealing with the amount of information; and, lack of metacognitive skills. Teacher issues included: difficulty understanding role as facilitator; difficulty managing groups; and, difficulty with student accountability and feedback. Many of the problems encountered in this study were predictable due to the fact that neither the students nor the teacher were familiar with this new redefinition of roles and responsibilities. The authors suggested various strategies to ease the transition for students including the definition of learning goals in advance of data gathering, the introduction of student-centered activities to accustom students to roles in ill-structured problem solving, and more focus on how the scaffolds could be used to structure their experience. Strategies for the teacher included more acclimatization to the process through discussion and videos of student-centered classrooms, more assistance with the management of cooperative learning groups, and assistance with the development of assessment measures.

This project suffers from what Brown and Campione (1996) term "surface procedures". Although the project was designed to foster problem-based learning, there are sets of supports and skills needed for problem-based learning (teacher scaffolding, modeling, cooperative group skills, question focusing skills, research skills) that were absent in the intervention. By using the concept of problem-based learning without understanding what underlying structures need to be in place to make it successful, the intervention was weakened considerably. Contrasting Decision Point! to the three projects (FCL, Jasper, CSILE) discussed above, illustrates that there is more to a constructivist program than calling it so. The roles of teacher and students in the classroom change dramatically when moving from a traditional to a constructivist classroom. These changes involve a movement on students' part from dependency to independence, a focus on knowledge construction for understanding as opposed to the passive reception of what an 'expert' tells you is true. Students need to hone skills in question identification, clarification, research, debate, and analysis. They need to understand the change in their role from competitive individual to collegial team member. The whole classroom environment has to change in order to facilitate the successful implementation of an intervention such as Decision Point! Yet, this intervention allowed only six-90 minute class sessions for all this role redefinition, skills acquisition and knowledge construction to occur.

A crucial factor in the successful implementation of a constructivist learning environment in the classroom is the teacher's influence on learning activities. The next section will discuss the teacher's role in the management and facilitation of effective learning.

The Role of Teachers in Constructivist Learning Environments

Boethel and Dimock (1999) describe the role of teachers in a constructivist learning environment as follows:

> - Teachers probe students' current understandings in depth by structuring activities that bring those understandings to light, by providing numerous opportunities for students to express their understandings, and by listening to students' explanations of their reasons and problem-solving strategies as well as to their answers.
> - Teachers seek a deep understanding of students' contexts, interests, and motivations, in order to create activities that engage students and build on their current interests.
> - Teachers foster a perspective on knowledge as functional understandings that have been reached through experience, experiment, and negotiation among multiple viewpoints; the scientific process is fostered as a strategy for reaching ever-more useful and broadly applicable understandings.
> - Teachers focus in depth on major concepts and "big ideas," rather than covering a broad range of information superficially and divorced from useful contexts.
> - Teachers organize instruction around learning problems that pique students' interest, challenge their current understandings, set the intended curricular concepts in meaningful contexts, and allow students to explore ideas, pose interpretations or hypotheses, test their ideas, apply them in other contexts, and reflect on their learning.
> - Teachers help to guide students as they work through learning problems, asking questions that lead students to examine their own ideas and reasoning processes, focusing issues, and providing access to additional information and resource materials.
> - Teachers foster student dialogue as a primary instructional tool, structuring the classroom to facilitate both student-to-student and student-to-teacher dialogue, to encourage the airing of ideas and uncertainties without fear of the stigma of "right" or "wrong," and to assure the meaningful involvement of all students in classroom dialogue. (p. 15)

One common misconception about constructivist learning discussed by Bransford et al. (2000) concerns the teacher's role in direct construction. They point out that, even in a lecture, students will attempt to construct new knowledge based on what they are hearing. Both Brown and Campione's benchmark lessons (1996) and the Cognition and Technology Group at Vanderbilt (1996) with their just-in-time teaching episodes include the possibility for direct instruction. The important difference between these interventions and the traditional transmission of instruction involves efforts to engage students in thinking about and grappling with topics before any instruction takes place, and the realization that student's prior knowledge needs to be acknowledged and accessed in the process of direct instruction.

In the previous sections of this review, I have examined what constructivism is, and how it might be instantiated in the classroom. When conducting my research, I chose to use developmental research, a form of research used in curriculum development and instructional design research, that I feel is congruent with the beliefs about knowledge and reality I discuss in chapter 3. The next section will discuss the salient features of developmental research, as well as examining two of its variants, action research and design-based research.

Development/Developmental Research

As mentioned previously, developmental research is a "cyclical process of theoretical reflection, conceptual analysis, small-scale curriculum development, and classroom research of the interaction of teaching-learning processes" (Lijnse, 1995, p. 192). Lijnse suggests that relevant methodologies for this type of research include introspection, interviews, classroom observation, protocol analysis of learning processes, historical analysis of concept development, and content analysis – whatever method gives insight into problems of teaching and learning and ideas about how to solve them. Van den Akker (2000) states that developmental research differs from conventional research in two ways: a) by its emphasis on "successive approximation of interventions in interaction with practitioners" (p. 8) and b) by the nature of knowledge in the form of context specific design principles, which arises from this research.

Differentiating Development Research

According to Van den Akker (2000), developmental research has been identified by various different terms: design and development research; design studies; design experiments; design research; development/developmental research; formative research; formative inquiry; formative experiments; formative evaluation; action research and engineering research. Many of these terms include the word design. The question becomes, how does one distinguish between the design activities carried out by professional instructional designers, and the practice of developmental research? According to Van den Akker (2000), developmental research differs from professional design activities in the following ways:

- Preliminary investigation is more intensive and systematic in developmental research with activities occurring such as literature reviews, expert consultation, analysis of available examples, and case studies of current practices to better understand the user context.
- More systematic effort is made to apply a theoretical rationale for design choices.
- Data is collected about the practicality and effectiveness of the design artifact in real settings with attention to a broad range of indicators for success.
- Systematic documentation, analysis, and reflection are carried out during the research in order to describe the process in depth.

Richey, Klein and Nelson (2003) state:

> Merely conducting a comprehensive design and development project does not constitute conducting a developmental research project…. One must also include the analysis and reporting stage to warrant being classified as developmental research. (p. 1104)

A discussion of research on business instructional designers by Richey and Nelson (1996) concurs with the differences mentioned above. Surveys of these designers reveal that needs assessment, task analysis, pilot tests or follow-up evaluations are rarely carried out while analysis and reporting of results is almost nonexistent. It seems sensible to conclude that the difference between design activities carried out by professionals and developmental research activities is manifested by the emphasis in development research on theoretical rationale for design decisions, the greater focus on literature review and context, and the requirements for documentation, analysis and reflection.

Action Research vs. Development Research

Another point of differentiation occurs between developmental research and action research. Developmental research is similar to action research in its emphasis on classroom research into curriculum change and the study of the teaching-learning process. Gordon Brockerville (n.d.) states:

> There are as many definitions of action research as there are researchers; however, the most widely cited is that of Wilfred Carr and Stephen Kemmis, in their book Becoming Critical: Education, Knowledge and Action Research. They write, "Action Research is simply a form of self-reflection enquiry undertaken by participants in a social setting [including educational settings such as schools] in order to improve the rationality and justice of (a) their own practice, (b) their understanding of these practices, and (c) the situation in which the practices are carried out."
>
> James McKernan, in his book Curriculum Action Research: A Handbook of Methods and Resources for the Reflective Practitioner, states that, "Action Research is the reflective process whereby in a given problem area, where one wishes to improve practice or personal understanding, inquiry is carried out by the practitioner --; first, to clearly define the problem; secondly, to specify a plan of action --; including the testing of hypotheses by application of action to the problem. Evaluation is then undertaken to monitor and establish the effectiveness of the actions taken. Finally, participants reflect upon, explain developments, and communicate these results to the community of action researchers. Action research is systematic self-reflective inquiry by practitioners to improve practice."
>
> Put more simply, action research for teachers is about studying what is happening in our school and deciding how to make it a better place by changing what and how we teach and how we relate to students and the community. It can be carried on by a single teacher or by a group of teachers working collaboratively (sometimes with students) on a given problem area.

Yoland Wadsworth (1998) states that in participatory action research we are:

- more conscious of 'problematising' an existing action or practice and more conscious of who is problematising it and why we are problematising it;

- more explicit about 'naming' the problem, and more self-conscious about raising an unanswered question and focusing an effort to answer it;
- more planned and deliberate about commencing a process of inquiry and involving others who could or should be involved in that inquiry;
- more systematic and rigorous in our efforts to get answers;
- more carefully documenting and recording action and what people think about it and in more detail and in ways which are accessible to other relevant parties;
- more intensive and comprehensive in our study, waiting much longer before we 'jump' to a conclusion;
- more self-sceptical in checking our hunches;
- attempting to develop deeper understandings and more useful and more powerful theory about the matters we are researching, in order to produce new knowledge which can inform improved action or practice; and
- changing our actions as part of the research process, and then further researching these changed actions.

There are great similarities between action research and development research. Differentiation between the two seems to occur mainly around the role of the teacher in the research process and the primacy of design activities.

Teacher action research is usually understood as a form of change-oriented research that is often instigated by the classroom teacher but may also be a collaboration between teacher and external researcher, whereas development research is often conceptualized and controlled by an external researcher. In developmental research, the teacher may participate in the conceptualization of the change to be effected, or not, but is certainly a participant in the decisions concerning implementation of that change in the classroom (For a more thorough delineation of roles between teacher and development researcher see the section following on participatory design).

The second point of differentiation concerns design activities. Development research as previously discussed by Van den Akker (2000) includes an extensive preliminary investigation with activities such as literature reviews, expert consultation, analysis of available examples, and case studies of current practices as well as a systematic effort to apply a theoretical rationale for design choices. Development research also has as one of its objectives, the design of something, whether it is a curriculum module, a software support, or a learning environment. Action research seems to be more oriented towards change in practice and less oriented toward design.

Design-Based Research vs. Development Research

A third point of differentiation occurs between the constructivist orientation of developmental research as espoused by Lijnse's definition and a movement, mainly from researchers in the United States, towards a very similar form of research called design-based research. There have been three special issues on this topic – Educational Psychologist, Volume 39, Number 4, 2004, Educational Researcher, Volume 32, Number 1, 2003, and The Journal of the Learning Sciences, Volume 11, Number 1, 2002. This type of research has its roots in the design experiments pioneered by Brown (1992) and discussed by Collins (1992). On first glance, both developmental research and design-based research seem synonymous; indeed Van den Akker (2000) lists design research as just another term for developmental research. However, while developmental research allows the in-depth examination of design projects in context as an allowable endpoint, many of the design-based researchers require that the end result of any intervention is theory building. For example, Barab and Squire (2004) tell us:

> Design-based research strives to generate and advance a particular set of theoretical constructs that transcends the environmental particulars of the contexts in which they were generated, selected or refined. . . . Design-based research requires more than simply showing a particular design works but demands that the researcher move beyond a particular design exemplar to generate evidence-based claims about learning that address contemporary theoretical issues and further the theoretical knowledge of the field. (p. 5 - 6)

Some design-based researchers also seem to place more of an emphasis on determining causal mechanisms during their interventions. Sandoval and Bell (2004) explain:

> One of the most commonly faced methodological issues in design-based research is the tension between making an intervention "work" in a complex setting, which often necessitates changing the intervention as it unfolds (in a way that mirrors the dynamic, contingent nature of decision making during teaching), with the researchers' need for empirical control, which argues against changing the planned "treatment". The general issue this raises is one of causal attribution:

> What makes a particular intervention successful in a particular place? How can what is learned from a particular success be generalized? (p. 200)

This emphasis on causal attribution and generalizability as well as theory that transcends the context seems to me to situate design-based research more closely with the post-positivist than a constructivist worldview and therefore I have not included an extensive review of their research in this section. However, many of the researchers who contributed to the section on participatory design following, as well as some of the authors of the articles I profiled earlier, consider themselves design-based researchers and many of their insights are included throughout this dissertation.

In the next section, I examine the literature concerning constructivist instructional design, with particular attention to the roles enacted by the co-participants in the design process.

Constructivist Instructional Design

As well as studying constructivist learning environments, I am also concerned with the design of artifacts or learning resources for these environments. I think it is important that the design process also mirror the constructivist principles discussed previously. There are a number of constructivist instructional design models available (Cennamo, 2003; Cennamo, Abell, Chung, Campbell, & Hugg, 1995; Hannafin et al. 1999; Jonassen, 1999; Moonen, 2000; Willis & Wright, 2000). Since the R2D2 model of Willis and Wright (2000) was quite similar to developmental research with its emphasis on iteration, reflection and participatory design, I decided to use it as my instructional design model. I will now discuss it in more detail.

The R2D2 Model

The R2D2 model (Willis & Wright, 2000), suggests the need to develop a team composed of designers and participants familiar with the local context in order to develop *phronesis*, an in-depth understanding of the context of use. As Colón, Taylor and Willis (2000) define it:

> R2D2 has four overarching principles: (1) recursion, (2) reflection, (3) non-linearity, and (4) participatory design. *Recursion* allows the designers to revisit

> any decision, product, or process at any time in the design and development of the product, and make refinements and revisions as needed. Recursion, or *iteration*, makes the design process a spiral – the same issues and tasks may be revisited many times across the design and development of a particular instructional product.
>
> *Reflection* is probably best understood by contrasting it with the opposite principle of design-technical rationality. Design based on a technical-rational approach requires developers to follow a set of pre-defined rules that prescribe what is to be done. Reflective design places less faith in preset rules and instead emphasizes the need for the designer to thoughtfully seek and consider feedback and ideas from many sources. For detailed information on the process of reflection in professional practice, see Schön (1983, 1987).
>
> The third guiding principle, *non-linearity*, comes from chaos theory (You, 1994). Instead of providing a linear sequence of steps that must be completed in a certain order, R2D2 suggests a set of focal points that need not be approached in any particular predetermined order. Different projects may call for different starting points. For example, the design process need not begin with a detailed plan that requires development of precise objectives at the beginning of the work. Objectives may, instead, emerge over the design process and not be completely set and clear until the end of the project. Thus, the design process commences wherever it is appropriate and progresses as appropriate.
>
> The last principle, *participatory design*, is based on the assumption that the context of use is critically important. Further, the people most familiar with those contexts will be the users. Therefore, they should be involved extensively in all phases of the design and development process (Schuler & Namoika, 1993). In R2D2, the idea of participatory design has been expanded beyond end users to include "experts" in the sense Eisner (1979) meant in his connoisseurship model of educational research. Thus, ID using the R2D2 design model involves a participatory team that guides the process. This team typically includes instructional designers, subject matter experts, teachers, and students. Members of the team are often referred to as *stakeholders*. (Colón et al., 2000, Guiding Principles section, Para. 1-4)

As you can see from this explanation, the cyclical and reflective nature of this model, coupled with the inclusion of the various stakeholders, makes it a model whose philosophy dovetails nicely with that of constructivist developmental research with its tentative and iterative nature, depending on "successive approximation of interventions in interaction with practitioners" (Van den Akker, 2000, p. 8). While the other aspects of the model are equally important, there is an extensive literature around the topic of participatory design, and I would like to examine that literature now as a way to identify the roles of the various stakeholders in the participatory design process.

Participatory Design

Participatory design in education (also called cooperative or collaborative design) is the inclusion of teachers and other educational representatives within a development team where they are actively involved with setting design goals and planning and testing prototypes. There are two guiding principles for effective participatory design: (a) there must be democracy of participation in all aspects of the design (Shrader, Williams, Lachance-Whitcomb, Finn & Gomez, 2001); and (b) quality improves with "strong and effective participation" (Shuler & Namoika, 1993).

Shrader et al. (2001) state that:

> Participatory Design research . . . is practice focused as designers must think critically about the interaction between their design and the teaching and learning in classrooms (p. 2). . . . Participatory design supports research for practice by sustaining a critical dialogue between the research and teaching community, promoting collaboration and professionalism among teachers, developing products tailored to local needs, supporting the growth of content knowledge as well as pedagogical knowledge among participants, and building local capacity toward reform. (p. 27)

Roles of Co-participants in Participatory Design

The literature on participatory design in education (Balka, Jones, Jorgenson, & Sinclair, 1998; Bouillion & Gomez, 2001; Brown & Edelson, 1998; Carr, 1997; Carroll, Chin, Rosson, & Neale, 2000; Cennamo, et al., 1995; Dodge, 1993; Good, 1992; Halverson & Gomez, 2001; Reiser, Spillane, Steinmuller, Sorsa, Carney, & Kyza, 2000; Shrader et al., 2001; Sandoval & Reiser, 1998; Sherry & Myers, 1998; Smith & Reiser, 1998; Walker & Gomez, 2001) provides information on the roles of the researcher and the teacher in the design process and provides guidance for the researcher when working with teachers. From an examination of this literature, a number of themes emerged concerning the interaction between designer and teacher. Some activities are specific to teachers, some to designer/researchers and other activities are shared between the co-participants in the process.

Designer/Researcher Activities

Activities specific to designer/researchers include initiating and sustaining the project, fostering a productive climate, and gaining an understanding of the classroom context.

Initiating and sustaining the project.

Willis and Wright (2000) suggest it is the designer's responsibility to create and support a participatory team. Dodge (1993) suggests that the university needs to be committed to the collaborative design process by providing financial support including stipends or load credits for faculty members involved. Dodge also mentions the need for adequate resources to develop and maintain the activities and adequate preparation and planning before beginning.

Fostering a productive climate.

Several authors suggest it is the designer/researcher's responsibility to ensure a positive climate (Carr, 1997; Carroll, et al. 2000; Dodge, 1993; Good, 1992; Shrader, et al. 2001). Activities suggested to foster positive working relationships include building relationships, establishing norms for constructive criticism, building trust and empathy and encouraging active participation by all team members.

> Methods are built on trusting relationships with users, which requires authentic engagement with users in such a way that their ideas are integrated into the design . . . and are motivated by an understanding that engaging users not only produces "buy-in", which in turn eases adoption, but also that products created in collaboration with users are better products. (Carr, 1997, p. 11)

Another climate setting activity involves the identification of participant concerns (Balka & Jorgenson, 1998; Carroll, et al., 2000; Reiser, et al., 2000). These concerns need to be made explicit and discussed early in the design process.

Gaining an understanding of the classroom context.

While it is the teacher's role in participatory design to act as tour guide and context matter expert, it is the designer/researcher's role to make an effort to understand that context.

> Observing and interviewing teachers in the classroom as they do a curriculum is part of collaborative design. . . . The point of this in-classroom work is to gain insight into practice and to problem-solve around issues of curriculum in practice to develop more effective learning units that are better adapted to the classroom environment. (Walker, 2001, p. 3)

Bouillion and Gomez (2001) discuss the cultural entailments, which they define as the goals, expectations, histories, values, and practices associated with the classroom. The challenge for designers is to make those entailments visible in order to "understand the process through which teachers from different communities of practice view and respond to those aspects in relation to their local context" (p. 11). Brown and Edelson (1998) suggest that designers need to understand the culture of the classroom and how teachers and students interact in that environment.

Teacher Activities

Activities specific to teachers include being a context matter expert, a tour guide, and a gatekeeper of change.

Context Matter Expert and Tour Guide.

Willis and Wright (2000) discuss the need to develop contextual understanding (phronesis) by including team members who are familiar with the target environment. This phronesis comes from identifying teaching and learning issues and the consequences of any design for students (Carroll, et al. 2000; Shrader, et al. 2001). Smith & Reiser (1998) make this point eloquently:

> A learner centered design framework suggests that the design of effective learning environments must take into account the context in which software is used, the tasks that students will perform, the tools provided to engage in these tasks, and the user interface to these tools. . . . Teachers helped us interpret the classroom context, co-developing activities and offering insights into their expectations of student performance. (p. 425)

An interesting example from Carroll, Rosson, Chin and Koenemann (1998) emphasizes the need for contextual understanding early in the design process. These researchers were using a form of envisioning called scenario design to specify what a virtual physics environment would look like in the classroom. When they began to study the classroom environment, they realized how little their scenario matched the actual classroom context. Where they envisioned a quiet environment where students on individual computers could collaborate remotely with students from other classrooms, they saw a crowded, noisy environment with limited computer access. Contextual understanding is essential for successful design, and teachers can provide invaluable advice about how a design idea would actually work in the classroom environment.

Acting as a tour guide, teachers can also lead in the development of courseware and classroom activities that make effective use of the design artifact and ensure that the design is responsive to the classroom environment (Carroll et al. 2000; Reiser et al. 2000).

Gatekeeper of change.

"The personal control inherent in teachers' work is what makes participation . . . so important. It is not just a matter of accurately describing the work, or even of designing appropriate support; the teachers also must accept and deploy "appropriate" solutions" (Carroll, et al. 2000, p. 250). There is no doubt that teachers' instructional decisions can impact negatively or positively on the use of any innovation. Utilizing teacher expertise in all aspects of the design process should surely help to design a product usable by other teachers – the ultimate goal for participatory design.

Shared Activities

Activities shared between the co-participants include the cooperative construction of knowledge (termed shared understanding) and participating in critical dialogue and reflection (termed sparring partners).

Sparring Partners.

This tongue-in-cheek descriptor aptly conveys the process of critical dialogue and reflection that is crucially important in collaborative design efforts. "The group must have a culture or norm that encourages members to question and critique one another. . . . Giving equal voice to teachers and researchers takes considerable effort and requires both to lay their egos aside and listen to the perspective of the other" (Shrader, et al. p. 29). Through group activities supported by dialogue and shared reflection, the design process moves forward (Sherry & Myers, 1998).

Reiser et al. (2000) discovered a tension between university mores of critical argumentation and the teachers' culture of collaboration and sharing. Both designers and teachers had to negotiate a common ground before they could communicate productively in the design process.

Shared Understanding.

Team members need to "co-construct a common conceptual ground, to establish a shared understanding and vision of the final product, and to share visual representations of the partially-developed structure of the product as it evolved" (Sherry & Myers, 1998, p. 6). Shrader et al. (2001) began their project by developing an overview of student tasks during inquiry. Working on that overview led both designers and teachers to move toward a common understanding of the design goals for their project.

Halverson and Gomez (2001) reinforce this idea:

> When each community participates legitimately in design, each has its own reasons, its own felt needs to engage in the process that can end up being made visible in the design process. This "making visible" of the assumptions that go into the design process can help both researchers and practitioners become aware of what the other expects from the consequent product (Suchman 1995). Using a collaborative design approach to address problems currently of interest to practitioners has the potential to open up the implicit network of assumptions, expectations, legitimation and design taken for granted in everyday work. Engagement in a common design task can allow practitioners and researchers to "place practice under negotiation" (Shrader, et al. 2000) by evoking actual theories in use instead of espoused practices. (p. 7)

Carroll et al. (2000) discuss how disparate team members, working from different perspectives, were able to converge on a common design solution:

> Some members of our project start from architectural considerations about collaborative software, albeit constrained by classroom activity requirements and overall design concepts. Some start from scenarios of project interactions for individual students and groups. The teachers, as designers, tend to start from classroom activities, pedagogical objectives, curriculum plans, and so on. What is true now, and was less true in the past, is that we are able to move convergently towards common goals from these diverse starting points. A key factor seems to be that even though different people take different approaches and represent different knowledge and skill, everyone understands everyone else well enough to see how we complement one another, and how things can fit together. (p. 245)

Other types of learning also occur throughout the collaborative process. The collaborative aspect of the design process can be instructive for both designers and teachers (Shrader, et al. 2001). "Deep engagement with subject matter and pedagogy . . . can serve as a vehicle for teacher learning and change" (Reiser, et al, 2000, p. 349). With the interchange of ideas, and the process of critical dialogue and reflection inherent in collaborative design, there is a strong element of professional development and learning throughout the design process as participants learn more about each others' cultural entailments, define their shared goals and negotiate their shared understandings. Teachers who lack a rich understanding of the domain may obtain support in understanding conceptual issues unfamiliar to them (Brown & Edelson, 1998), while designers learn about "pedagogical goals and practices, classroom management, school system politics, the relationship of community and the schools" (Carroll, et al. 2000, p. 249). Teachers may be introduced to new ways of thinking about learning in the classroom and new ways of working with students. These activities of knowledge building and collaboration work together to provide a grounded learning experience beneficial to all participants.

In conclusion, a look at the literature on participatory design has uncovered the activities recommended for both designer/researchers and teachers within the process.

> Participatory design focuses directly on classroom practice, as the goal is to develop innovations that improve or leverage teaching and learning. In order to design useful products designers must think critically about the interaction between their design and teaching and learning in the classroom. When done well, this means beginning with in-depth analyses of existing practice, carefully crafting designs to improve or leverage that practice, and critically assessing the result. . . . A focus on practice requires that designers attend both to teaching and learning in classrooms. That entails addressing issues related to what is difficult for teachers as well as for students . . . by bringing teachers into the design process it brings classroom practice into the discussion. (Shrader et al. 2001, p. 4)

Summary

This literature review surveyed information relevant to the design of constructivist learning environments. I began by briefly describing the historical development of constructivist ideas through the theories of Piaget and Vygotsky. Next I detailed the nine elements of constructivist learning that I had identified from the literature on constructivist learning environments: (1) Learning involves the active construction and reorganization of knowledge, (2) the learner defines meaning, (3) prior learning is important, (4) learning is mediated, (5) learning is a collaborative, social-dialogical activity, (6) learning is reflective, (7) learning involves multiple perspectives, (8) knowledge is anchored in the context of the learning activity, and, (9) learning is internally controlled. Then I identified the design recommendations arising from these characteristics. Next I looked at three technologically mediated constructivist learning environments: FCL, CSILE and the Jasper Woodbury series. I also examined two constructivist projects in social studies: Students as Hypermedia Designers and Decision Point! Following that, I discussed recommendations concerning what role teachers should play in constructivist learning environments. Next, I examined facets of developmental research, situating it within a constructivist methodology and differentiating it from instructional design, from action research and from a new type of developmental research, called design-based research that is becoming more common in the learning sciences. I analyzed one model of constructivist instructional design, R2D2 (Willis & Wright, 2000), in detail. Finally, I examined the research on participatory design to identify the activities of designer/researchers and teachers. I found that the roles for designer/researchers included initiating and sustaining the project, fostering a productive climate, and gaining an understanding of the classroom context, that the roles for teachers included being a context matter expert, a tour guide, and a gatekeeper of change and that two activities, the cooperative construction of knowledge (termed shared understanding) and participating in critical dialogue and reflection (termed sparring partners) were shared between them.

How does this literature review relate to my study? I used the examples of constructivist learning found in FCL, CSILE and Jasper to give me ideas about the design of constructivist learning environments. When I went to design my resource, I kept the theoretical foundation of the study, the nine elements of constructivist learning in mind as I began the process of design and I tried to address as many of the characteristics as I could when designing. For each element I was able to use, I also considered the guidelines recommended for that element.

Lijnse's idea of developmental research, the "cyclical process of theoretical reflection, conceptual analysis, small-scale curriculum development, and classroom research of the interaction of teaching-learning processes" (1995, p. 192) was my touchstone in the research process. As I implemented my design and researched the process, I used many of the methodologies he had suggested including a preliminary context analysis, interviews, observations, introspective journaling, and continuing theoretical discussions with peers and my advisor to provide me with the data I used in the analysis of the study. The R2D2 model (Willis & Wright, 2000) complemented this methodology with its emphasis on iteration, reflection and the inclusion of the various stakeholders during design. Finally, the analysis of participatory design identified the various roles of researcher and co-participants in the process.

Paralleling the design process, my research questions examined this iterative developmental research process in a qualitative manner. The research questions were designed to capture the details of the design and implementation process, provide data concerning student and teacher reactions to the project as it unfolded and identify aspects of the classroom context that affected implementation. Other questions examined the developmental research process itself in a reflective manner, considering my experiences in the study, the model chosen for design, and what could be learned about developmental research as a way to study the process of constructivist learning in the classroom.

CHAPTER 3: METHODOLOGY

Beliefs about knowledge and reality

Lincoln and Guba (2000) outline the various worldviews or paradigms that may guide researchers. These worldviews, labeled as positivist, post-positivist, critical theory, constructivist and participatory paradigms, are based on assumptions about ontology, epistemology and what are considered the appropriate methods for conducting research. Since I have come to believe that I operate from a constructivist worldview, this paradigm will be discussed below.

Guba and Lincoln (1989, 1994) discuss the constructivist research paradigm as consisting of a relativist ontology, a transactional/subjectivist epistemological stance and a cyclical methodology of iteration, analysis, critique, reiteration, reanalysis (p. 109). A relativist ontology assumes "multiple, apprehendable, and sometimes conflicting social realities that are the products of human intellects . . . that may change as their constructors become more informed and sophisticated" (Lincoln and Guba, 1994, p. 111). Von Glasersfeld (1991) rejects the notion that "knowledge ought to be a veridical 'representation' of a world as it 'exists' prior to being experienced" (p. 16). In other words, constructivists reject the realist assumption of an "independent objective world that stands apart from our experience of it" (Schwandt, 1994, p. 127). When discussing the ontological debate Bruner (1996) states:

> The "rightness" of particular interpretations, while dependent on perspective, also reflects rules of evidence, consistency and coherence. Not everything goes. There are inherent criteria of rightness, and the possibility of alternative interpretations does not license all of them equally (p.14). . . .
>
> The "reality" that we impute to the "worlds" we inhabit is a constructed one. To paraphrase Nelson Goodman, "reality is made, not found". Reality construction is the product of meaning making shaped by traditions and by culture's toolkit of ways of thought. (p.19)

A transactional/subjectivist epistemology means "the investigator and the object of investigation are assumed to be interactively linked so that the "findings" are *literally created* as the investigation proceeds" (Lincoln and Guba, 1994, p. 111).

Constructivist methodologies emphasize the social construction of knowledge between research participants. The process unfolds through a dialectic of "iteration, analysis, critique, reiteration, reanalysis . . . that leads eventually to a joint (among inquirer and respondents) construction of a case" (Schwandt, 1994, p. 129).

Description of the Research Process

Consonant with my philosophical stance as a constructivist researcher, I conducted an interpretive study examining the process of developmental research and exploring the product of that research. In the following section, I will discuss the research questions that guided my analysis, the teachers who were my co-participants, the sources of data that I examined, and the data analysis. I will also examine the specific activities that formed the developmental research cycle in this study. Following that, I will discuss standards of quality in naturalistic research, the role of values in my research, ethical considerations, and the limitations and delimitations of this study.

Research Questions

These are the questions that guided my inquiry throughout the study.

Regarding the design and development of constructivist learning environments for designated Alberta middle years social studies classrooms:

- What is the process involved in the design, development, and implementation of an effective constructivist learning environment in the designated classroom?
- What can be said about the learning experiences of the students as they work in the prototype learning environment?
- What are the barriers or facilitators in the study classroom that impinge on student-centered learning?

Regarding the process of developmental research:

- What can be said about my experience as a designer/researcher occurring as a result of the developmental research process?
- What can be said about the design model used during the developmental research process?
- What can be said about developmental research as a process for design, development and implementation in the classroom?

Participants

I solicited the help of classroom social studies teachers who were either currently teaching in a constructivist learning environment or expressed interest in working in this type of environment. Participants were identified through the recommendations of Education faculty and school consultants, through contacts made during research projects and university classes I was involved in at that time, and through messages placed in school board newsletters or local computer journals and listservs. Once identified, these teachers were invited to participate in my study. I worked with two teachers, one on a volunteer basis, and one as a participant in my research study. Teacher's names have been changed to ensure their anonymity.

In the spring of 2002, I was involved in a volunteer project with Marie, a grade 8 teacher. She was interested in exploring the use of video in her Social Studies classroom and since I had a background in video production from my university coursework, I volunteered to assist her. Together we designed a project that integrated video, Internet access and history. Since I found that the understandings I gained from working with Marie were very helpful as I began to conceptualize my dissertation study, I requested that she share her understandings about this project with me as part of my dissertation research as well. After ethics approval was granted, I interviewed her as part of a formative evaluation of our project. Marie also contributed her knowledge and experience in an interview concerning the process of teaching in a constructivist classroom. We also collaborated on teacher presentations concerning our experiences; information from these shared discussions has also been included in this research.

In the autumn of 2002, a second grade 8 Social Studies teacher, Lisa, agreed to participate in my study as well. She was familiar with Marie's project from our presentation and expressed an interest in doing a similar project in her classroom. I worked with Lisa for two terms from fall 2002 to spring 2004. Together we designed a learning experience for her students related to an event in the grade 8 history curriculum.

Data Sources and Data Collection

There were four main sources of data in this project. The first source comprised the project materials made available to students. These materials were student handouts, photocopied articles and pictures, Internet links to other resources, and a website designed to provide a rich set of materials for use in the project (found in the enclosed CD). The second source of data was a number of interviews. The interviews, which were tape recorded and subsequently transcribed, occurred between October 2002 and June 2004 and included a) 8 teacher interviews, 2 of which included formative evaluation of the project; b) 30 student interviews (13 after Year 1 and 17 after Year 2); c) 5 formal peer debriefing interviews; and d) 2 expert interviews concerned with using constructivism in the classroom. The third data source was the observation logs that I wrote as the project progressed while the fourth source comprised reflections and analytical notes written during the course of the two years. Following work in the field, I read through the interviews, logs and reflections to pull out themes related to my research questions.

Final Data Analysis

Data analysis for this study involved the on-going analysis of field notes and reflections arising from classroom observation, plus the examination of documents and interview transcripts from teachers, students and peers. After the project was over, I reviewed my data sources and coded the descriptions using common-sense categories arising from the discussions. To aid in this analytic process, I used a Macintosh computer program called TAMS Analyzer. The program acronym stands for Text Analysis Mark-up System and it uses a system much like HTML to identify text using codes chosen by the user. I read through each log, interview and reflection and tried to give logical textual units a meaningful code. In some cases, textual units (paragraphs or sentences) might be assigned to several codes depending on the ideas represented within.

Once documents are coded, TAMS Analyzer can be used to pull out any instances of an individual code, much like a search in a database. It will also pull out any instance of coded text, and organize the results according to criteria you designate. I chose to pull out all the coded text and organize it alphabetically by code, then save it to a text file. In this way, I could read over any instances of a certain code throughout all the documents. I used this process to identify themes reported in subsequent chapters. I also saved the coded excerpts from TAMS in a Filemaker database, which I could then search with any word, not just my codes, and pull out specific instances. I also used Filemaker to separate the excerpts into separate years. I could then export those instances to a word file for further use. The last thing I did with my data was to take all the logs and all the interviews (separated into teacher and student files) and combine them. This was useful if I was looking for something I remembered reading but did not know where it was located since the coded excerpts did not include every word from the documents.

Thematic Analysis

Once I had completed the initial coding of data, I used my research questions as a partial organizing framework in which to situate my analysis. I separated my data into groups based on those codes that referred to students' experience, my experience as a designer and a researcher and the research process. I also examined elements of context and those were addressed in the Barriers and Facilitators section of Chapter 7. Once I had those larger categories, I examined those groups in more detail. Within the student category, themes such as group work emerged quite readily, since students often discussed that topic in their interviews. Other themes were more subtle, but were often a result of questions I had asked students about the project as I tried to determine what worked well for them as a learning experience. The four elements I used as organizing themes, derived from my analysis of constructivist learning, seemed to work well to categorize the second level themes such as accountability, or depth of understanding that emerged when aggregating the first level codes.

The Developmental Research Cycle

I utilized developmental research methodology by following a cyclical pattern that included: (a) initial interviews with teachers concerning the topics of constructivist learning environments and subject area needs; (b) initial classroom observations to gain an understanding of context; (c) ongoing theoretical development based on literature review, ongoing theoretical discussions with peers, teachers and advisors, personal reflection and introspective journaling; (d) the development of a prototype; and, (e) formative evaluation (based on further interviews, observations and trials of the artifact) leading to revision. Attention to implementation concerns was an important element throughout the study as well. The process was tentative and iterative, where insights arising from the examination of the prototype in practice in a previous cycle were used as a basis for revisions in the next cycle. This process was carried through three cycles. It was initiated during a volunteer project, then refocused and refined in two other iterations.

Description of the Design Process

The guidelines of constructivist instructional design - recursive (iterative) non-linear design, reflective design and participatory design - formed the cornerstones of the design process. Throughout the process, I tried to consciously consider my role as a co-participant in design, attempted to ensure an atmosphere of trust and empathy, and encouraged active participation in the design process by my teacher colleagues.

This participatory design process began during the volunteer project with Marie. After agreeing to work together on a video project modeled on the CBC "Heritage Minutes" format, I spent about two weeks gathering resources from my coursework and the Internet and putting together a tentative project outline for Marie. When we met, we discussed implementation and she made suggestions for changes that she felt were needed. I designed instructional support materials, both computer and paper-based and these were used to focus student attention on the most important aspects of learning how to create video. Marie designed the evaluation activities by creating rubrics as well as ensuring that the students were engaged in on-going discussions of the project. After the project was complete, we conducted our own formative evaluation.

Although my dissertation research with Lisa focused on just one historical topic, the Northwest Rebellion, while the volunteer project was designed around researching a number of events in Canadian history, the idea of creating videos similar to the Heritage Minutes in order to deepen the students' knowledge of history was still the basis of both projects. Many of the instructional materials designed for the video topics were carried over from the first project. Understandings I had gained from working with Marie were also evident as I worked with Lisa to design this new project. Because my experiences from the volunteer project informed the design of the subsequent learning resource, I felt that I needed to include information from the first project in my dissertation discussions in some way.

The first iteration of my dissertation began in November 2002, with the decision to focus on the Northwest Rebellion. At that time we also decided to spread the research on the topic over two months and have students work on the project one day a week, then write scripts and film during March 2003, when the special room we needed for filming was available. This meant that any resources for the project had to be available early in January 2003. I collected primary materials during December and January and designed a portal for online resources on the topic. I also revised the video instructional materials based on feedback from Marie's project. Lisa designed the evaluation documents. The project was implemented; we evaluated its effectiveness and made suggestions for improvements. I also interviewed students and solicited their suggestions for change.

Over the summer of 2003, I visited many of the sites of the rebellion (Fort Battleford, Fort Carleton, Duck Lake, Batoche, Frenchman's Butte) and collected more primary materials from these sites as well as from the collection at the University of Saskatchewan. In the fall of 2003, I designed an information web site that presented as many primary materials, documents, and pictures as I could find that I felt were relevant to the project. This website was published on the local server at the school so that its use was not restricted by the school's slow Internet access. I revised documents and activities based on our formative evaluation from Year 1 and we carried out the project for a second time. During this iteration, we had the students work through the whole project in one block of time. After implementation, we evaluated the project one last time. I also interviewed students about their experiences and solicited suggestions for improvement.

Standards of Quality in Qualitative Research

In 1982, Guba and Lincoln identified four criteria to judge the quality of qualitative research. These criteria included credibility, transferability, dependability, and confirmability and were analogous to internal validity, external validity, reliability and objectivity in experimental research. These criteria were based on foundationalist assumptions that are at odds with the social constructionist philosophical viewpoint as well as postmodern assumptions (Guba & Lincoln, 1989). As an example, Richardson

(2000) has suggested that the metaphor of triangulation (a rigid fixed property) needs to be replaced with that of crystallization (a combination of "symmetry and substance with an infinite variety of shapes, substances, transmutations, multi-dimensionalities, and angles of approach"). She says "crystallization provides us with a deepened, complex, thoroughly partial understanding of the topic. Paradoxically, we know more and doubt what we know" (p. 934).

In the traditional formulation of triangulation, we use multiple data sources (interviews, participant observation, logs, video/audio etc), multiple perspectives (different viewpoints of stakeholders, different standpoints), multiple methods (quantitative as well as qualitative) or multiple researchers to validate our findings, to zero in on one single representation. However, the metaphor of crystallization directs our attention to the idea that there is a multiplicity of perspectives that may each be considered *valid.* "The core of postmodernism is the *doubt* that any method or theory, discourse or genre, tradition or novelty, has a universal and general claim as the "right" or the privileged form of authoritative knowledge" (Richardson, 2000, p. 928).

In their later writing, Guba and Lincoln (Guba & Lincoln, 1989; Lincoln, 1995) state that the foundational criteria for judging the quality of constructivist research have been superceded by an emphasis on authenticity, critical subjectivity and reciprocity during the research process "as a means of judging the processes and outcomes of naturalistic or constructivist inquiries" (Lincoln & Guba, 2000, p. 180). The meanings of these three criteria and ways in which they can be addressed during the research process are discussed below.

Authenticity

Lincoln and Guba state, "Those authenticity criteria - so called because we believed them to be hallmarks of authentic, trustworthy, rigorous, or "valid" constructivist or phenomenological inquiry - were fairness, ontological authenticity, educative authenticity, catalytic authenticity, and tactical authenticity (Lincoln & Guba, 2000, p. 180).

Fairness

"Fairness may be defined as a balanced view that presents all constructions and the values that undergird them" (Guba & Lincoln, 1989, p. 79). Constructions must be clarified and checked using the member checking process. The fairness criterion reminds us to consider the perspectives of the teacher and students during the research process. Fairness attends specifically to the issue of voice, striving to ensure that all participants, researchers, teachers and students alike, have an equal chance to express their opinions and understandings and have these voices represented in the products of the research.

Methods that can contribute to fairness in constructivist inquiry include the provision for informed consent, as well as methodological considerations such as reflexivity, peer debriefing, prolonged engagement and member checks.

Informed consent.

As well as attending to the details which we normally consider important for informed consent, (detailed consent forms, arrangements concerning confidentiality, disclosure of research purposes and the ability to withdraw at any time) fairness dictates that arrangements be made which also negotiate ownership of the data, distribution of the results and limits on the use of participants' words and experiences.

Reflexivity and peer debriefing.

Both reflexivity and peer debriefing are used to uncover researcher assumptions, make them explicit and communicate them to the participants in the process. Through reflexivity, researchers attempt to uncover their own beliefs and values while peer debriefing provides another means to uncover tacit understandings. Peer debriefing activities such as meetings with fellow doctoral students and my supervisor increased authenticity by expanding the number of people who discussed my interpretations and meaning constructions.

Prolonged engagement.

Prolonged engagement allows the researcher to build a relationship of trust with their research partners as well as to ensure an in-depth understanding of participants' perspectives and situation. I was involved with activities in Lisa's classroom for 2 years.

Member checks.

Both teachers were given the opportunity to respond to my interpretations by reading drafts of the final documents. Students were not consulted via member checks but every effort was made to faithfully represent their voice throughout this document.

Educative authenticity

"Educative authenticity represents the extent to which individual respondents' understanding of and appreciation for the constructions of *others* outside their stakeholding group are enhanced" (Guba & Lincoln, 1989, p. 248). Activities such as the internal audit, where participants read the drafts of research findings, can aid their understandings of the other participants in the research process. Discussing the design process resulted in changes in understanding for both my co-participants and myself as we explored the meanings involved in facilitating constructivist learning in the classroom setting.

Catalytic authenticity

Catalytic authenticity is defined "as the extent to which action is stimulated and facilitated by the evaluation process" (Guba & Lincoln, 1989, p. 249). Findings relayed through journals and conference presentations, while useful for the advancement of the researcher, are less than useful for the other participants. Provision for more widespread dissemination of research findings such as training sessions or presentations for stakeholders or other practitioners outside the study will encourage catalytic authenticity. This has not been pursued thus far, but may happen in the future.

One type of catalytic authenticity was present within the study. Due to the ongoing formative evaluation, action was stimulated when both the participating teachers and I made changes to the project.

My project may also be the catalyst for others to change their teaching practices or to extend my project to other contexts as a result of reading about my project or hearing my presentations.

Tactical authenticity

"Tactical authenticity refers to the degree to which stakeholders and participants are empowered to act" (Guba & Lincoln, 1989, p. 250). This type of authenticity moves the researcher from a disinterested stance towards an advocacy role. For example, constructivist research conducted with a Freirian stance would see the participants as co-researchers invested with the power to transform their world. In this study, my advocacy was manifested through the production of scaffolds or tools that empowered the teacher and students to work more effectively in their joint learning environment. As a result of my participation in this study, I acquired knowledge that could empower me to work with other teachers who wish to change their practice.

Critical subjectivity

Critical subjectivity is "the ability to enter an altered state of consciousness . . . for the purpose of understanding with great discrimination subtle differences in the personal and psychological states of others" and that "enables the researcher to begin to uncover dialectical relationships, array and discuss contradictions within the stories being recorded and move with research participants towards action" (Lincoln, 1995, p. 283). Critical dialogue and reflexivity are essential components of the participatory design process and were nurtured throughout the study. Critical dialogue was fostered throughout the study through peer and teacher debriefing as we worked towards a common understanding. My written logs and observations helped me to reflect on conversations and events that took place throughout the study.

Reciprocity

Reciprocity reflects the need for a research relationship to have a sense of "trust, caring and mutuality" (Lincoln, 1995, p. 284). My impression was that, in both instances, the teachers and I felt this atmosphere during our work together.

Role of Values in Research

I do not believe in the positivist supposition that it is possible to remove values from the conduct of research. I think that both the choice of a topic to study, and the method used to carry out that study are dictated by the researcher's values about the conduct and proper focus for research. It seems to me that the qualitative process of explicating your values through reflexivity is much more honest. Reflexivity provides a means whereby researchers can examine their values and beliefs and bring them out into the open for others to scrutinize. To me, this process also makes the research more ethical, since researchers can then be open with their co-researchers about motives and reasons for conducting research and how these values and beliefs will shape the research process as well as the final reporting. It also creates an opportunity for dialogue between the participants in the research process about issues of power and voice.

What are my value stances in regard to this research?

I believe that schooling needs to change from teacher-led instruction to learner-centered knowledge construction. In my readings, I have encountered numerous examples of learner-centered instruction that foster higher order thinking skills and give students the cognitive tools they need to be successful, lifelong learners. I also believe that the implementation of these learner-centered environments requires the scaffolding that computer technology affords.

I believe that computers can be very useful in education, but only if used appropriately. Although I am an enthusiastic supporter of computer use in education, there are many situations where computers are used inappropriately. Computers can be used as effective tools to alleviate drudgery (e.g., second drafts of reports or essays, reporting marks, administrative functions), to simulate reality, to collect and analyze data (probes in scienceware, database or Internet research) and to help students acquire a more sophisticated understanding of very complex ideas (e.g., Thinkertoys for Physics). I believe computers play a vital role in constructivist learning environments. However, computers can be used inappropriately in education as well (overuse of drill and practice for poor students, use as a reward system, focus on font and color versus content) and I support computer use only when it is appropriate and necessary.

How are my values likely to have affected the research process?

Because of my generally positive bias towards computers, I am often inclined to view the integration of technology into education as more positive or successful than it actually is. I tried to guard against reading positive outcomes when my participant was actually more neutral toward the experience. I tried very hard to ensure that I understood my participant's thoughts and feelings throughout the project and that I reflected an accurate account of our experiences.

I tried to ensure that I was not filtering my participant's experiences through my own lenses. To this end, I monitored my own reactions carefully throughout the research process to ensure that I was not reacting to things in my lived experience rather than that of my participant. I tried to verify my participant's meaning by using clarification probes and active listening to ensure that I understood my participant's view of events or feelings. I documented my impressions in field notes and my reflexive journal as soon as possible afterwards in order to reflect on atmosphere and to make sure that any insights were recorded for later analysis. Finally, I tried to make my values clear to my participants by discussing my feelings about constructivism and computer use in education.

Ethical Considerations

I ensured that this study conformed to the University of Alberta guidelines for research in the following ways:

- By ensuring that participants were free to choose whether or not to participate in the study;
- By using pseudonyms for names and places to ensure confidentiality;
- By ensuring that any other people who interacted with me concerning this project (i.e. fellow researchers, transcribers, assistants) agreed to maintain participants' confidentiality;
- By discussing the nature and purpose of my study through an introductory letter to my participants, and following that up with an introductory session where participants are free to question me about the study;
- By ensuring that all people involved signed a voluntary consent form or if a minor, that their parent or guardian gave permission to participate;

- By ensuring that participants were aware they could opt out of the study at any time; and,
- By providing participants opportunities to check the accuracy of my interview transcripts, field notes and interpretations (member checks) and allowing them to delete portions of their own material that they did not want included.

Limitations and Delimitations

There were limitations inherent in the school setting. Not all children chose to become involved in the study. Constraints from the school environment, which included timetable pressures and curriculum dictates, limited the study by restricting the length of time that could be allocated to the project. In junior high, students are scheduled into class periods that change about every 45-50 minutes. They move from room to room with every class. These short periods restrict the activities that can be accomplished in a day. Curriculum in grade 8 social studies consists of three major topics. Topic B, Canadian history is allocated one-third of the year, about three months. The need for students to learn the full span of Canadian history, from the first settlements until the early 1900's severely restricts the time available for implementation of the study project.

My study followed the developmental research cycle only as far as the formative evaluation stage. While aspects of usability and further concerns surrounding implementation were probed during the interview process, final summative evaluations to identify such things as improved student learning were not carried out.

This study is delimited to the design and implementation of a constructivist learning resource in a Western Canadian middle years social studies classroom. The fact that the curricular topic being studied was only offered once a year in the curriculum meant it was not possible to carry out more than one iteration in a school year. In order to go through the process of developmental research this required that the study be extended over several years.

CHAPTER 4: PROJECT BEGINNINGS

My research story actually begins in 1994 when I took a class entitled "Principles and Practices of Authoring Interactive Instruction". During that course, in addition to learning how to design software with Authorware, I also became exposed to ideas about constructivist learning. Those ideas, encountered in a small book by Jerome Bruner, intrigued me so much that I knew I wanted to study more about how these ideas could affect how people learn. From the time I conducted my first research into constructivism in that class, I was very interested in how the ideas surrounding this epistemological stance could be translated into educational practice. I attempted to incorporate constructivist design principles into any instructional design projects I developed.

When I decided to take the big step and apply to the doctoral program, the idea of constructivism was always present in the back of my mind as a theme I wanted to pursue. I have always been a rather pragmatic person, and when I read an article by Reeves (2000) entitled *Enhancing the worth of instructional technology research through "design experiments" and other developmental research strategies*, the suggestions in this article were very much in tune with my own feelings about research. I decided to combine my two main interests, learning theory and instructional design, by conducting a developmental research study to design and implement a constructivist learning resource.

My first step was to identify the characteristics of constructivism so that I could be sure that what I designed was actually a constructivist resource. Through extensive reading, I attempted to gain a deeper understanding of constructivist pedagogy. As a way of coming to terms with the often differing viewpoints on constructivism as an approach to teaching and learning, I decided to see if I could synthesize the research into a series of categories, finally arriving at nine categories. Next, I matched these categories with the recommendations of designers about how to implement constructivist learning environments (see literature review, chapter 2 for a discussion of the categories identified and the recommendations based on these categories). I also discussed ways of implementing constructivist ideas, specifically with an acquaintance who had taught Grade 8 Social studies.

My next step was to enlist the aid of a constructivist classroom teacher with whom I could work. I wanted to work with a teacher for several reasons. First, I do not think I had ever experienced a constructivist environment, with the exception of one university class, and I felt I needed to observe how this would look and feel in the school setting. Second, as a student of change theory, I was acutely aware of the pitfalls of designing a resource for the classroom without understanding the context and having the full cooperation of the teacher who would be implementing what I designed. I also thought that an experienced Social Studies teacher would also contribute subject matter expertise that I lacked. Then I met Marie.

Marie: A Volunteer Collaboration

Marie was a grade 8 teacher with 22 years of experience teaching Social Studies and a Master's degree in curriculum studies. I contacted Marie and asked if she would be interested in being involved in the design of a constructivist learning resource. She was not particularly interested, saying that she was much too busy. As we chatted, talking about my thoughts for projects, I mentioned my background in multi-media and video. At the mention of video, she talked enthusiastically about an idea she had been mulling over for making her own class version of CBC's Heritage Minutes. She wanted to integrate student historical research with video production as a way of infusing Information and Communication Technology (ICT) objectives into the curriculum. According to the Alberta Education website:

> The Information and Communication Technology (ICT) curriculum provides students with a broad perspective on the nature of technology, how to use and apply a variety of technologies, and the impact of information and communication technologies on themselves and on society. The ICT curriculum is not intended to stand alone, but rather to be infused within core courses and programs. (Alberta Education, retrieved May 18, 2006)

I thought this sounded like a great project, lots of fun and one where I could contribute my technical knowledge. We would work together to produce our own homegrown version of "Historical Minutes" a take-off on CBC television's Heritage Minutes – one minute vignettes of Canadian history.

The Project

Since a practicing classroom teacher does not have a lot of time, and since I was the one who wanted to design something, Marie and I decided that I should be the main project designer. My initial thought was to design something that was completely self-contained – some kind of technological scaffold similar to those I had been studying such as the CTGV's Jasper experiment (1997) or the virtual principalship resource (Maynes, McIntosh and Mappin, 1996). But I had very little time to develop anything comprehensive since we would be implementing the project within weeks of our initial meeting so what was developed was a collection of Internet links, computer and paper-based tutorials, and assignment sheets.

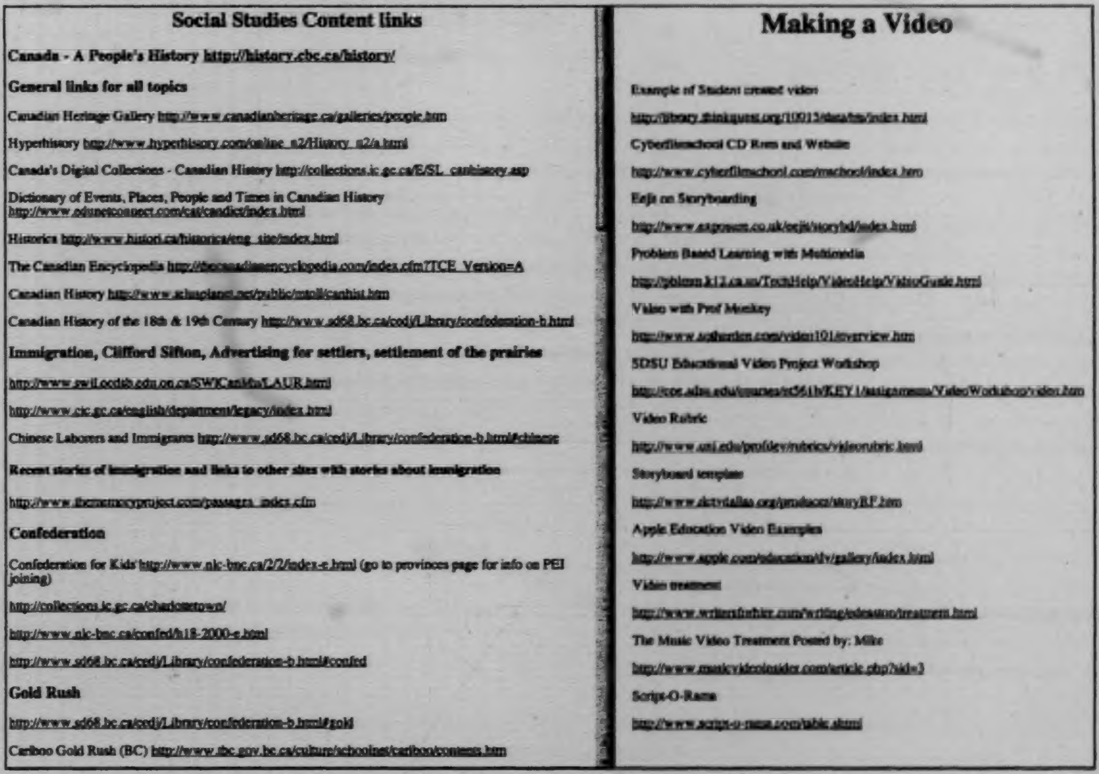
Developing the Project Resources

Figure 1: Topics for Project

Marie decided on the actual historical topics to be researched by her students, based on those events in Canadian history that she felt were important. After she sent me the topic list, shown above in Figure 1, I spent a number of days searching for online resources and found some real gems, including the site for Canada, A People's History – **http://history.cbc.ca/history**. Marie had also found some useful sites for history. In Dreamweaver, I developed a web page with links to all the sites we had both found and this was posted in my Shaw webspace for students to access.

Starting from a collection of websites compiled for my video production class I located resources to scaffold the topics I felt we needed to cover in depth – camera operation; videography basics; treatments, storyboards and scripts; and editing. I also developed blank templates for designing storyboards and scripts.

Figure 2 shows portions of the two web pages mentioned above. The accompanying CD also contains links to these pages.



Social Studies Content links

Canada - A People's History http://history.cbc.ca/history/

General links for all topics

Canadian Heritage Gallery http://www.canadianheritage.ca/galleries/people.htm

Hyperhistory http://www.hyperhistory.com/online_n2/History_n2/a.html

Canada's Digital Collections - Canadian History http://collections.ic.gc.ca/E/SL_canhistory.asp

Dictionary of Events, Places, People and Times in Canadian History http://www.edunetconnect.com/cat/candict/index.html

Historica http://www.histori.ca/historica/eng_site/index.html

The Canadian Encyclopedia http://thecanadianencyclopedia.com/index.cfm?TCE_Version=A

Canadian History http://www.schuplanet.net/public/mtoll/canhist.htm

Canadian History of the 18th & 19th Century http://www.sd68.bc.ca/cedj/Library/confederation-b.html

Immigration, Clifford Sifton, Advertising for settlers, settlement of the prairies

http://www.swil.ocdsb.edu.on.ca/SWICanHis/LAUR.html

http://www.cic.gc.ca/english/department/legacy/index.html

Chinese Laborers and Immigrants http://www.sd68.bc.ca/cedj/Library/confederation-b.html#chinese

Recent stories of immigration and links to other sites with stories about immigration

http://www.thememoryproject.com/passages_index.cfm

Confederation

Confederation for Kids http://www.nlc-bnc.ca/2/2/index-e.html (go to provinces page for info on PEI joining)

http://collections.ic.gc.ca/charlottetown/

http://www.nlc-bnc.ca/confed/h18-2000-e.html

http://www.sd68.bc.ca/cedj/Library/confederation-b.html#confed

Gold Rush

http://www.sd68.bc.ca/cedj/Library/confederation-b.html#gold

Cariboo Gold Rush (BC) http://www.tbc.gov.bc.ca/culture/schoolnet/cariboo/contents.htm

Making a Video

Example of Student created video

http://library.thinkquest.org/10015/data/hts/index.html

Cyberfilmschool CD Rom and Website

http://www.cyberfilmschool.com/mschool/index.htm

Eejit on Storyboarding

http://www.exposure.co.uk/eejit/storybd/index.html

Problem Based Learning with Multimedia

http://pblmm.k12.ca.us/TechHelp/VideoHelp/VideoGuide.html

Video with Prof Monkey

http://www.sotheriden.com/video101/overview.htm

SDSU Educational Video Project Workshop

http://coe.sdsu.edu/courses/et561b/KEY1/assignments/VideoWorkshop/video.htm

Video Rubric

http://www.uni.edu/profdev/rubrics/videorubric.html

Storyboard template

http://www.dctvdallas.org/producer/storyBF.htm

Apple Education Video Examples

http://www.apple.com/education/dv/gallery/index.html

Video treatment

http://www.writersforhire.com/writing/education/treatment.html

The Music Video Treatment Posted by: Mike

http://www.musicvideoinsider.com/article.php?sid=3

Script-O-Rama

http://www.script-o-rama.com/table.shtml

Figure 2: Left page – history resources Right page – video resources

I developed my own version of the Apple iMovie tutorial – I used the digitized clips available with iMovie 2 and wrote paper tutorials for the main actions students would need to carry out in the project – digitizing clips, editing clips, adding transitions, titles and credits. I needed to modify the stock tutorial for two reasons. First, I needed to contextualize the tutorials for the local setting. Secondly, I wanted the tutorial to show only those activities needed for our project.

I developed a paper-based tutorial that guided students through a computer-based tutorial on videography that I had used during my own course work. Since the actual resource, designed for a full year course in videography, was quite lengthy and would have taken a number of classes to complete, the tutorial focused on only those topics I felt we needed to emphasize during the project.

When I showed these resources to Marie, she asked me to develop some assignment sheets for students to complete that would focus their attention on important topics in videography and script/storyboard development. While most of the abovementioned resources were designed to be used individually by students, I also designed one full class activity that used several of the CBC Heritage Minutes movies to help students understand the elements of a video.

To recap, project components included: a) student online research resources; b) video concepts – treatments, storyboarding and scripting; c) camera operation and digital editing techniques; and e) student video production.

Developing a Constructivist Project

What differentiated this project from a project that might be developed for a traditional classroom? As one teacher that I know phrased it, "it depends on how the teacher chooses to use the site whether it promotes social constructivism or not. The data is there but an old-fashioned grouchy teacher could just make the kids answer questions and do a test." I think it is a similar thing with this project. A collection of resources and instructional aids do not a constructivist project make. It is the way a project is structured and implemented that dictates whether it will be constructivist or not.

I will examine the constructivist aspects of this volunteer effort by comparing it to the categories and recommendations that I generated as a framework for constructivist learning in chapter 2:

(1) Learning involves the active construction and reorganization of knowledge (Boethel & Dimock, 1999; Brown & Campione, 1994; Duffy & Cunningham, 1996; Ewell, 1997; Fosnot, 1984; Grabinger & Dunlap, 1995; Jonassen et al., 1998; Koschmann, 1996; Lebow, 1995; Piaget, 1955, 1976; Resnick, 1987; Wilson & Myers, 1999).

(2) The learner defines meaning (Bruner, 1996; Ewell, 1997; Hannafin et al., 1999; Jonassen et al., 1998).

(3) Prior learning is important (Boethel & Dimock, 1999; Brooks & Brooks, 1993; Hannafin & Land, 2000; Piaget, 1955).

(4) Learning is mediated by artifacts, tools and signs (Duffy & Cunningham, 1996; John-Steiner & Mahn, 1996; Vygotsky, 1978; Wilson & Myers, 2000).

(5) Learning is a collaborative, social-dialogical activity (Brown & Campione, 1990; Duffy & Cunningham, 1996; Grabinger & Dunlap, 1995; Jonassen et al., 1998).

(6) Learning is reflective (Brown & Campione, 1996; Duffy & Cunningham, 1996; Jonassen et al., 1998).

(7) Learning involves multiple perspectives (Boethel & Dimock, 1999; Duffy & Cunningham, 1996; Jonassen, 1991; Lebow, 1995).

(8) Knowledge is anchored in the context of the learning activity (Brown et al., 1989; Duffy & Cunningham, 1996; Jonassen et al., 1998).

(9) Learning is internally controlled (Lebow, 1995, Scardamalia et al., 1989).

Marie encouraged her students to take ownership of all aspects of the project in the following ways: they were allowed to choose their own working groups as well as a choice of the topic they would research (within the constraints of the social studies curriculum); they decided how they would carry out the research and they identified the salient information that was included in their portrayal of the historical event; they also wrote the scripts and treatments, shot the video, acted in the movie, made decisions about which video footage to use in their movies, digitized the content and edited the clips for their movies; and they made decisions about quality and sometimes re-shot scenes they were dissatisfied with. From these activities, they constructed an idea of an event based on their own research.

Three of the categories I defined for constructivist learning fit nicely with these student activities: (1) learning involves the active construction and reorganization of knowledge; (2) the learner defines meaning; and (9) learning is internally controlled. Guidelines from these categories included: a designer should create a learning environment to support and challenge the learner's thinking (Savery & Duffy, 1995) and allow students to gain experience with knowledge construction by determining topics, methods for how to learn and solve problems (Honebein, 1996); teachers should act as facilitators of this process (Honebein, 1996); and learners should be encouraged to develop ownership for the overall project or task and be given ownership of the process used to develop a solution (Savery & Duffy, 1996; Lebow, 1995).

The classroom environment throughout the year emphasized cooperative group activities and contributions from all members. The project relied on the interdependence of all members of the project group. This environment of cooperation reinforces another facet of constructivism, category (5), that 'learning is a collaborative social-dialogical activity' supported through social negotiation of knowledge, not competition.

Category (6), 'learning is reflective', was addressed in a number of ways throughout the project. Every week students reflected on the learning process, what was working well and what needed improvement. At the final presentation, students discussed their historical understandings as a result of the project, what they would do differently if they could do it again, and things such as stereotyping through media distortion from the one minute limitation.

Category (8), 'knowledge is anchored in the context of the learning activity', was a challenging concept to address. Authentic, contextual learning in schools is difficult to implement due to the constraints of time and curriculum. In this project, the idea of filming a historical minute puts the student in the role of videographer, with the need to learn techniques for shooting and editing video, as well as finding the historical content for the video. This makes the project somewhat more authentic than the typical student assignment of "write an essay about …". Students were able to anchor their learning about video production into the context of the production (Savery & Duffy, 1996).

Category (4) states 'learning is mediated' (by artifacts, tools and signs). One of my main tasks as designer was to address the guidelines from this category to produce cognitive tools for Marie's students, and to provide access to expert performances and model processes students needed to learn (Herrington & Oliver, 2000; Jonassen, 1999). A number of cognitive tools were provided, including web links to history sites as scaffolds for research, tutorials for video production, storyboarding, video techniques, and iMovie editing plus instructional aids (disguised as assignments) that focused student attention on important features. Teacher coaching was on-going and involved guidance for research and technical concepts. Expert performances were present in the examples of the Heritage Minutes movies used for demonstration.

Prior learning, category (3), and multiple perspectives, category (7), were not addressed in any formal way in this project. Since both the historical content and the video concepts were new to students, there was no attempt to address students' previous learning in these areas. Multiple perspectives may have been a factor in discussions within the groups, but for most of the historical topics, with the exception of the perspectives of the groups involved in the Northwest Rebellion, or immigrants to Western Canada, there were not opportunities to explore multiple perspectives within the topics.

To summarize, student ownership, collaboration, reflectivity, and meaning making were important features of this project, with coaching, expert performance and cognitive tools present for student support.

Implementing the Project

The Setting

The K-9 school of approximately 400 students is located in a large town. Students come from the town as well as the rural area surrounding the town. The school culture fosters a high trust level. Students know the rules and do not overstep boundaries; this leads to a culture where risk taking is encouraged, students are allowed to fail but are basically expected to behave well (and do). This high trust level is manifested by the fact that students are allowed to work unsupervised in other parts of the school as well as in their classrooms, Internet and network access is open, and computers are not locked down.

The classroom was equipped with five desktop iMacs, and an LCD projector. The school also had a portable lab of 28 iBook wireless laptops with a high-speed Internet connection that could be booked by teachers and moved to their classroom when needed. All the computers were equipped with an "office package" and iMovie. The laptops were connected via an Airport wireless base and could be used both in the classroom and throughout the school.

From the limited time I was able to work with them, these students seemed very similar to the Grade 8 students I worked with when I was a computer consultant for a small rural school division in Saskatchewan. During my last two years in that division, I spent a great deal of time teaching at this grade level in a school containing both small town and rural students. Marie's students were very similar in behavior to those Grade 8 students I worked with. There appeared to be a range of abilities within her classroom. One of the striking things about working at the Grade 8 level is the range in both height and maturity levels you notice with these students. While I would say that the typical problems with classroom management that ordinarily crop up in a junior high classroom were somewhat less in this class, the normal frictions (gender issues, cliques, social isolates) that you notice at this age level were present in this class as well.

The students were quite computer literate since they had been using computers for various projects throughout the year. However, most had never used video editing software or operated video cameras before this project.

The Process

As an initial activity, all the students viewed several of the CBC Heritage Minutes clips. A teacher-led instructional support asked the students to describe the story and compare tone, pace, music and props needed. After this initial activity, designed to give them an introduction into video production concepts, the students were divided into three groups. One group worked through a computer tutorial about video production. The second group learned about storyboarding and scripting through a paper-based tutorial. The third group worked through a computer tutorial about iMovie, learning how to use the computer editing software to assemble their movie. The students rotated through these three groups so that all students learned video production, scripting and computer editing. These activities were all designed to integrate ICT objectives into the social studies curriculum.

During this time, students were allowed to situate their working groups throughout the school. This was possible for two reasons. First, the students were using wireless laptops that would work throughout the school. Second, these students had been prepared throughout the school year to work independently. As Marie stated:

> For the previous six months of the school year, the students had been engaged in a series of exercises or 'small steps' to build a climate of cooperation and collaboration. Through a series of projects based on the social studies curriculum, they worked in a variety of heterogeneous groups building cooperative learning skills such as positive interdependence, and individual accountability for meeting the objectives, as well as engaging in team building exercises. Participation of all group members, negotiation of tasks and group reflection on success and concerns was built into the evaluation. Students were encouraged to take risks and

> experience failures as part of the process. Throughout this process, a level of trust was established such that after an initial daily lesson or project report, groups of students would work in spaces throughout the school, supervised on a "walk-about" basis. (Marie, Interview, February 2003)

After the students had worked through the three strands, they were given a list of historical events to research. The six groups chose an event and, using text and Internet sources, they found information about their chosen event. After writing a treatment and presenting it to Marie for approval, they developed storyboards and scripts, brought in clothing and other props and began to film their movie. When filming was complete, they digitized their footage, edited the clips together and added titles, music and credits. Their final task was to present their movie to their classmates. During that presentation, which was attended by invited guests, the students discussed what they had learned about history, what they had learned about making videos and what they thought needed to be changed or improved if they were to do this project another time. Marie then converted the videos from iMovie to small QuickTime files and posted them on her class website. Subsequent to this project, and after ethics approval, Marie and I developed a presentation about the project that was presented at a teacher's conference.

Formative Evaluation

I felt that I had learned a great deal from this volunteer project and wanted to capture my understandings within my dissertation. For this reason, I asked Marie if she would mind sharing her insights about constructivism and this project. She agreed to be a part of my dissertation research by discussing this first project and talking about her role as a teacher in a constructivist classroom. I conducted two interviews with her after my ethics approval, one about her thoughts on the project we had done together, and one about features of a constructivist classroom. The following paragraphs contain Marie's thoughts about the project, taken from the first interview.

Throughout the projects, Marie encouraged student reflection by giving the students weekly activities and checklists asking them what they were learning, how they felt about the process they were going through and what they thought needed improvement in the project. When I asked her to talk about the students' reflections, she explained:

> The students' reflections revealed that they understood what they were trying to do, and had a developing plan for the end product. There was continual risk taking, and revision to the plan was a daily occurrence. They reported struggles with a steep learning curve; attempting to learn history and a multitude of videographic and production skills simultaneously was challenging, but could be achieved. They were dissatisfied with poor quality, often spending free time editing, revising and re-shooting portions of the video, and continually planned ways they would change things if given the opportunity. The "paperwork" of the project was the least liked task, but at differing points for each group, they all expressed the need for some type of guide to "keep everyone on task" and "see where they were heading" with the project. Many had group members return to "tutorials" to reinvestigate a skill or technique. Negotiation of levels of participation of group members was ongoing, and varied, depending upon the group, from easily agreeing upon tasks and consensus, to frustration and teacher intervention to assist in the formation of a workable agreement. The learning of the context of history was present, but often did not progress as strongly as the technical skills and knowledge. Class debriefing discussions centered on how the students would make changes if they had more time, how the videos narrowed a single perspective of history, and elements of their work of which they were most proud. Further, they expressed satisfaction with group learning in all but one case. One group experienced significant difficulty in organizing themselves and completing tasks, but felt they had grown significantly in collaboration and group interdependence, while learning a little about history. During our class celebration where we viewed the videos produced with an invited adult audience, the students were all able to articulate the meaning portrayed in their video, why they chose the props, actions, dialogue and design features showcased in the video. Each group's video met the evaluation criteria to a satisfactory level. Some stereotyping of the events or participants took place and was a point of discussion by the class for how history is portrayed in media. (Marie, Interview, February 2003)

When I asked Marie to discuss the project as a whole, she concluded:

> I found the project to be successful in terms of our desired outcomes. The student engagement and expressed level of learning was high. They reported that they learned a great deal about movie making and a bit about the history of Canada. The project brought to life many of the constructivist principles you and I sought to incorporate; active construction and reorganization of knowledge, artifacts, tools and signs mediating learning, and learning as a collaborative, social-dialogical activity to name a few. The classroom and hallways during "work" periods came alive with dialogue and skill building as the students negotiated their way through the tasks and defined their own meaning. Some brought prior knowledge of events or skills with technology to the projects, but all improved in some skill areas, as stated in their self-evaluations. The continual reflection was habit forming, and students became more comfortable with the process as evidenced by the increasing ease with which they could articulate their thoughts, the increased speed at which they wrote in journals, and the increased length and complexity of the content of their reflections. The Internet and text based research

> was adequate, with most groups focusing on surface details. Two groups, however, began to delve into a deeper understanding of the events, searching for primary sources of research and incorporating actual historical documents captured from websites into their video. As evidenced by the language and planning viewed throughout the process, all the students engaged in higher order thinking skills and metacognition. There was significant role-realignment; previous class leaders became equal participants, and in three instances lower achieving students took on leadership roles, which were positively recognized by their classmates.
>
> At the culmination of the project, I felt that the students should have spent more time on the research components of the project, and had more in-depth knowledge of the depicted event. The restriction to one minute of tape, which was dictated both by the limits of our computers' storage capacity and the format of the Heritage Minutes model was confining. Further, we took on too many new tasks, and students chose to focus on learning the technology more fully rather than conducting more research once they had enough detail to tell the story. I felt this could be countered in a repeat of the project, by introducing portions of the technical aspects (how to use iMovie, and how to compose shots, for example) earlier in the year, and integrating the research throughout the term. With these technical skills in place, writing the script and storyboard would more easily follow and there would be more opportunities for me, the teacher, to assist the students to add more historic content. The ease with which the students used those technological skills developed throughout the first portion of the year is evidence that this would be a more successful methodology. (Marie, Interview, February 2003)

I also thought the project was moderately successful, given its rushed nature. I was dissatisfied with some of the instructional aids I had designed, notably the assignments for videography and storyboarding. They were overly long and lacked interest. I did feel that the whole class activity on video concepts went fairly well, and with the exception of some minor modifications to the assignment, this activity was used throughout my dissertation project. I was excited with the evidence of learning that was manifested in the videos – since students had done all of the filming and editing with little guidance from either Marie or me, it was obvious they had learned quite a bit about video as a result of our project.

Another idea for improvement we discussed was the idea of doing a whole class video project first before students even split into groups for research and filming. We thought it would help students understand some of the video concepts more clearly if the class was to storyboard, film, and then analyze the resulting video. A whole class analysis would allow students to discuss good and bad features of their video and give them more authentic reasons for why they needed to pay attention to developing the storyboard and script as well as paying attention to shots, camera angles and other video features.

My Reflections on Cooperative Design

Up to this time, my instructional design efforts had been solitary and I found the co-operative process to be very different. We often had to negotiate a "shared understanding" (Sherry & Myers, 1998; Skaalid, 2003b) in order to work together productively. When I asked Marie to become involved in my dissertation project, I found that it was very difficult to present my project in a way that made sense to a classroom teacher. I had been immersed in the theoretical understanding of constructivism, but I found it very hard to present my ideas in a way that resonated with her beliefs about efficacy in the classroom. I learned very quickly about the gap between academic and practitioner. As we worked together to develop an idea for a project, I would suggest ideas based on the research I had read, while Marie would critique those ideas based on her knowledge of her students and the local situation. For example, my initial proposal involved a grouping scheme that utilized the jigsaw approach (Aronson, 1978). I thought that each group could become an expert in a certain area (video, scripting, editing, researching) and then the groups could be recombined to have one expert each when the actual video production occurred. Marie pointed out that students who were not involved in the technological activities (i.e. video editing, using the video tutorial) would be unhappy to be left out and asked that all students learn all the aspects of the project. This caused the project to have a longer duration but ensured that all students experienced every component. The end result was less polished than it might have been, but the level of excitement and engagement more than made up for any shortfalls and it insured that all students experienced the various activities required by the ICT objectives.

As I reflect on this project, I am struck by the impact that a classroom teacher's philosophy of learning will have on any activities carried out within her classroom. In this project, I stepped into a classroom where a lot of attention had been paid to the development of a collaborative environment. Students in this classroom had been acculturated to work effectively in groups and had been held accountable for their own learning throughout the year. Marie's philosophy was similar to mine, in that we both wanted to design an environment which would encourage students to delve deeply into a subject, to construct their own knowledge, to take responsibility for their own learning, and to examine, in a metacognitive way, the learning process in which they were involved.

CHAPTER 5: THE PROJECT, YEAR 1

Enlisting Teacher Help (Again!) Here's Lisa!

During the 2003-2004 school term Marie was seconded for a special project and would not be in the classroom for some time, so I needed to find new teacher co-participants. Marie and I had presented our Historical Minutes video project to a group of teachers and one of those teachers, Lisa, had mentioned she might be interested in working with me in the next school year. I emailed Lisa in the fall to see if she was still interested, we met for coffee to discuss my project and she agreed to work with me. Lisa was a veteran teacher with a specialization in home economics. She had taught the grade 8 social studies curriculum for three years and also taught home economics and art.

I started observing and volunteering in Lisa's grade 8 classroom in November of 2003. At that time, she was involved in a project for Topic A (Geography) that had students planning the itinerary for a rock band. I collected online resources for the project, posted them online on a web page, and helped in the computer lab as a technology expert. At the same time, that gave me the opportunity to meet and get to know the students before my design project began after Christmas. At this time, we also distributed the ethics forms for student and parent approval and talked with the students about the video project. Lisa and I met several times to talk about ideas for the video project, settling on the idea of researching the North West Rebellion. I submitted some ideas for activities to be carried out during the project; we screened some video resources, and examined some text-based resources from the district media library. During Christmas holiday, we met once more to finalize the project, decide on the final form of the assignments, and schedule the project.

Organization of this Chapter

There are several ways to organize a description of a developmental research project. One might describe each year in detail, and then discuss the final artifact designed in some detail. I have read several dissertations organized in this manner. They tend to be very repetitive and extremely dry to read. Not wanting to bore my readers with endless repetition, I have chosen to discuss the artifact created first, and then discuss the implementation in order to minimize repetition. If my readers have a good understanding of the actual design, then when I refer to activities, I do not need to describe them in detail over and over again. Descriptions of the events occurring in this chapter are based on my observation logs, reflections, and interviews.

The North West Rebellion Project (2003)

Rationale

We chose the North West Rebellion topic for several reasons. Many of the issues that still plague Canada today in terms of Western alienation and feelings of powerlessness within the Canadian union first emerged during this time. It is an important event in the formation of Canada, it highlights many issues concerning aboriginal and Metis rights still being contested today, it is a topic that plays a prominent role in both the old and new curriculum for junior high social studies, and we felt it was one of the more interesting historical topics in the curriculum to engage students. It was also timely in that the retrial of Louis Riel had just been enacted and was being discussed in the news.

Goals for the Project

Both Lisa and I had specific goals for this project. These goals included content goals as well as process goals.

Designer Goals

Using the research on ways of knowing in history, these were my goals for a constructivist experience in history.

Students, as a result of participating in the project, would:

- learn about a topic as a historian would; e.g., examination of primary documents; construction of timelines.
- understand that history is not a given: there is interpretation involved in all historical accounts
- understand that multiple perspectives are present
- understand that dominant history is usually written by winners – they need to understand whose voices are empowered and whose are silenced

I also articulated some learning goals for this project.

Students, as a result of participating in the project, would:

- show empathy for the group they examined in detail
- be actively involved in research and coming to terms with an understanding about the events
- be involved in a collaborative experience
- be analytical, critical thinkers, questioners
- be ENGAGED

Teacher Goals

Lisa had a mix of content and affective goals for the students.

Students, as a result of participating in the project, would:

- gain an in-depth understanding of Riel and his role in Canadian history
- understand how European expansion affected native peoples
- improve technical skills (computer conferencing, Internet use, video production, digital editing) in order to integrate ICT objectives into social studies
- use higher order thinking skills and work collaboratively

We both articulated the desire to design a project that students would perceive as fun and memorable. We felt this was important because people tend to remember information more easily if they are engaged in an active, stimulating experience, one that is different from their daily routine. At the beginning of our planning, we both talked about projects from school that we still remembered fondly, and both these projects were active and perceived as fun.

Constructivist Aspects of the North West Rebellion Project

What is missing from the short description of goals above are the philosophical ideas that provided the structure for this project. While content acquisition was somewhat important in this project, the constructivist stance that I, as the designer, tried to incorporate into the project is also an important facet of the rationale. At the risk of putting the cart before the horse to some degree, I will now discuss what I see as the constructivist underpinnings of this project. To do this, I will examine the constructivist aspects of this project by comparing it to the framework for constructivist learning derived from my research into constructivist learning environments in chapter 2. These categories include:

1. Learning involves the active construction and reorganization of knowledge
2. The learner defines meaning
3. Prior learning is important in knowledge construction
4. Learning is mediated by artifacts, tools and signs
5. Learning is a collaborative, social-dialogical activity
6. Learning is reflective
7. Learning involves multiple perspectives
8. Knowledge is anchored in the context of the learning activity
9. Learning is internally controlled

Guidelines from category (9) stated that learners should be encouraged to develop ownership for the overall project or task and be given ownership of the process used to develop a solution (Savery & Duffy, 1996; Lebow, 1995). Students were encouraged to take ownership of all aspects of the project in the following ways: they were allowed to choose their own working groups which in turn dictated which perspective they would research (within the constraints of the social studies curriculum and this project); they decided how they would carry out the research and they identified the salient information that was included in their portrayal of the historical event; they also wrote the scripts and treatments, acted in the movie, made decisions about which video footage to use in their movies, they digitized the content and edited the clips for their movies; and they made decisions about quality and sometimes re-shot scenes they were dissatisfied with. From these activities, they constructed an idea of an event based on their own research (Category 2).

Guidelines from Category (1) suggested that a designer should create a learning environment to support and challenge the learner's thinking (Savery & Duffy, 1995) and allow students to gain experience with knowledge construction by determining topics, methods for how to learn and solve problems (Honebein, 1996). The learning environment we designed had supports in terms of providing content (website, PowerPoint timeline, paper resources, Canada, a People's History videos, textbook) but allowed the students the freedom to choose from this multiplicity of resources the topics and information needed to design their script and movie. We both provided guidance throughout the project by monitoring the groups and making suggestions for topics when groups expressed a need for help. We made a conscious effort, though, to remain as much as possible in the background during student group work so that students would feel that the project was a result of their decisions and their research activities.

While Lisa's classroom environment was more traditional than Marie's was, students were given the opportunity throughout the year to engage in some cooperative group activities (e.g., the geography project). The Rebellion project relied on the interdependence of all members of the project group and in some instances groups worked well together, while in other instances, group interdependence was less evident. This environment of cooperation reinforces another facet of constructivism, category (5), that 'learning is a collaborative social-dialogical activity' supported through social negotiation of knowledge, not competition. Another guideline in category (5) suggested by Jonassen (1999) was to provide conversation and collaboration tools. In Year 1 of the project, when the research was carried out weekly for eight weeks, we used NiceNet, an Internet supported conversation tool, as a way to have students communicate their findings to one another. In this setting, when students were doing research at other times than in class, NiceNet seemed a useful tool. In the second year, when all the research was carried out at the same time and Lisa was somewhat reluctant to provide the students with computer time due to behavioral issues with the large class, NiceNet was much less useful and did not play a meaningful part in the project.

Category (6), 'learning is reflective', was only evident in the first year of the Rebellion project and was much less emphasized than in Marie's classroom. At the final presentation for their video, Year 1 students discussed their historical understandings about the rebellion, as well as what they would do differently if they could do it again. We were not that impressed by the results of this activity so we did not ask the Year 2 students to do this.

Category (8), 'knowledge is anchored in the context of the learning activity', was difficult to implement due to curriculum constraints. To make the project more authentic, students were asked to become investigative reporters, working for a fictitious newspaper, the Prairie Snitch, researching information for interviews and videos and posting their findings for their fellow group members to see. Students were also put in the role of videographers where they learned techniques for shooting and editing video, as well as filling a historian's role when finding and organizing the historical content for the video. This type of authentic and situated learning (Brown et al., 1989; Savery & Duffy, 1996) has an objective of producing students who, if studying history, understand how a historian would acquire knowledge, find information in his/her field and integrate this knowledge to solve problems in the field.

One of my main tasks as designer was to address the guidelines from category (4) to (a) produce cognitive tools, (b) provide access to expert performances and (c) model processes students needed to learn (Herrington & Oliver, 2000; Jonassen, 1999). A number of cognitive tools were provided to address guideline (a). In Year 1 there were web links to history sites, paper-based materials as scaffolds for research, tutorials for video production, storyboarding, video techniques, and iMovie editing plus instructional aids (disguised as assignments) that focused student attention on important features. These materials are described in more detail in the following section entitled Project Description. Teacher coaching (guideline c) was on-going and involved guidance for research and technical concepts. Expert performances (guideline b) were present in the examples of the Heritage Minutes movies used for demonstration.

In Year 2, there was a comprehensive website with links to a timeline, sections on events, people, perspectives, primary sources and web links to exemplary sites discussing the rebellion. There were also still paper-based resources about the rebellion, and tutorials for video production, storyboarding, and video techniques. While Year 2 placed less whole class emphasis on topics such as camera techniques based on student feedback from Year 1, there was still support for digital editing on an individual basis.

Prior learning, category (3), was not addressed in any formal way in this project. Since both the historical content and the video concepts were assumed to be new to these students, there was no attempt to address students' previous learning in these areas.

Multiple perspectives, category (7), was a strong focus in the Rebellion project. By separating the students into groups and providing many primary sources within these groups, we hoped students would arrive at an understanding of some of the perspectives present at that time in history.

To summarize, student ownership, communication and collaboration, reflectivity, multiple perspectives, and meaning making were important features of this project, with coaching, expert performance and cognitive tools present for student support.

Project Description

The project was designed to engage the students in deep, authentic learning about the Northwest Rebellion. To make the assignment more authentic, we decided the students should be investigative reporters for a newspaper called the Prairie Snitch, as previously described. I acted as the editor, Cornelia Snitchcroft, and the teacher, Lisa, was the assistant editor, Ethyl Brown. As journalists, they would choose one of five groups involved in the Northwest Rebellion (settlers, Metis, First Nations, military/police, government), research their group's perspective, and design a 1-2 minute video showing that perspective.

The project was composed of three elements: content acquisition, communication and video production. Following is a description of these components.

Content Acquisition

Resources provided to facilitate content acquisition included a file box of photocopied articles, videos from Canada, A People's History, links to a number of websites that discussed the Northwest Rebellion, and a PowerPoint presentation highlighting the main events of the rebellion. We utilized the file box of paper documents and the videos, in particular, to provide a pool of information that was not dependent on slow Internet access. While we would have liked to use the Internet more fully, the reality of slow connections and time wasted for start up and shut down of computers in the lab necessitated that we streamline information collection as much as possible. (As an example, here is my log entry from January 28, 2003: *The majority of students managed to get logged in, read something and entered something. So for actual time on task, 10 minutes of confusion at the beginning, 5 minutes at the end to log off and come back to room, 10-15 minutes for log in and waiting for things to appear. Total usable class time to learn something out of a 50 minute class – about 20- 30 minutes. Flies by like the wind.*) Many students did utilize the Internet for research during out of class hours (some had faster connections at home than at school) but many only looked at resources available at school. One student remarked during an interview "Like I went home and I did it because my computer's faster than these ones" (Abby, Interview, 2003).

I would now like to describe these resources in detail.

The file box of photocopied articles

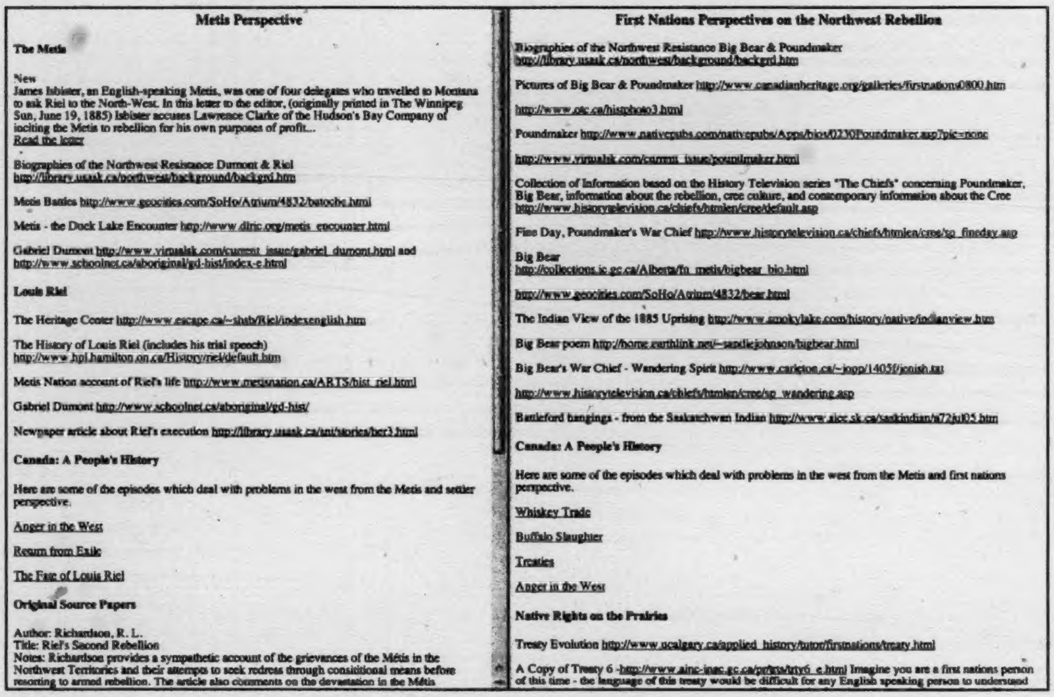
The articles were organized into six categories of readings: a) White Settlers; b) Metis, c) First Nations; d) Government; e) Military/Police; and f) Overviews/Timelines. The first five article categories paralleled the student groups. Articles within each group were chosen to provide in-depth coverage of events that were important to that particular group. For example, there were several accounts from settlers, First Nations or military people discussing events they experienced. Many of these articles were primary sources that gave accounts of events that happened during the rebellion. Some articles were newspaper stories written about events. Other articles, while not primary sources, were descriptions of people who had been involved in the rebellion. As an example of a primary source, one of the articles that students especially liked was an article written by Elizabeth McLean. Elizabeth, a young girl of 16 at the time of the rebellion, was captured at Fort Pitt, along with her family. After being captured by Big Bear's warriors, the captives spent several months marching through the bush in Northern Saskatchewan. A bibliography of the documents in the file box is available on the accompanying CD.

Videos from 'Canada, a People's History' (CaPH)

These videos provided a dramatic re-enactment of some of the events occurring during the rebellion. According to the website, the series tells Canada's story through the eyes of the people who lived it. We spent quite a large block of time viewing these videos because we felt they would provide information for those students who find it difficult to collect information through reading. The videos were quite new (copyright 2001) and seemed to provide a balanced perspective on all sides of the rebellion. Students were required to make summaries of what they had learned immediately after viewing these videos.

Web links

A web site was developed with links to a number of websites that discussed the Northwest Rebellion including links to the CaPH website that provided information paralleling the videos. While it would have certainly been useful to have students search for these websites themselves, and thereby gain valuable experience in online searching, we felt that our project was already quite time-consuming and students would not benefit by adding still another complex skill on top of those video skills and concepts we were already introducing. Links were provided for the following topics: Overview of the events of the Northwest Rebellion; Metis Perspective; Settlers Perspective; First Nations Perspective; North West Mounted Police/Military Perspective; Government/Eastern Canada Perspective; Links to information about Canadian History; and, Links to information about making video.



Metis Perspective

The Metis

New
James Isbister, an English-speaking Metis, was one of four delegates who travelled to Montana to ask Riel to the North-West. In this letter to the editor, (originally printed in The Winnipeg Sun, June 19, 1885) Isbister accuses Lawrence Clarke of the Hudson's Bay Company of inciting the Metis to rebellion for his own purposes of profit...
Read the letter

Biographies of the Northwest Resistance Dumont & Riel
http://library.usask.ca/northwest/background/backgrd.htm

Metis Battles http://www.geocities.com/SoHo/Atrium/4832/batoche.html

Metis - the Duck Lake Encounter http://www.dlric.org/metis_encounter.html

Gabriel Dumont http://www.virtualsk.com/current_issue/gabriel_dumont.html and http://www.schoolnet.ca/aboriginal/gd-hist/index-e.html

Louis Riel

The Heritage Center http://www.escape.ca/~shsb/Riel/indexenglish.htm

The History of Louis Riel (includes his trial speech)
http://www.hpl.hamilton.on.ca/History/riel/default.htm

Metis Nation account of Riel's life http://www.metisnation.ca/ARTS/hist_riel.html

Gabriel Dumont http://www.schoolnet.ca/aboriginal/gd-hist/

Newspaper article about Riel's execution http://library.usask.ca/sni/stories/her3.html

Canada: A People's History

Here are some of the episodes which deal with problems in the west from the Metis and settler perspective.

Anger in the West

Return from Exile

The Fate of Louis Riel

Original Source Papers

Author: Richardson, R. L.
Title: Riel's Second Rebellion
Notes: Richardson provides a sympathetic account of the grievances of the Métis in the Northwest Territories and their attempts to seek redress through consititional means before resorting to armed rebellion. The article also comments on the devastation in the Métis

First Nations Perspectives on the Northwest Rebellion

Biographies of the Northwest Resistance Big Bear & Poundmaker
http://library.usask.ca/northwest/background/backgrd.htm

Pictures of Big Bear & Poundmaker http://www.canadianheritage.org/galleries/firstnations0800.htm

http://www.otc.ca/histphoto3.html

Poundmaker http://www.nativepubs.com/nativepubs/Apps/bios/0230Poundmaker.asp?pic=none

http://www.virtualsk.com/current_issue/poundmaker.html

Collection of Information based on the History Television series "The Chiefs" concerning Poundmaker, Big Bear, information about the rebellion, cree culture, and contemporary information about the Cree
http://www.historytelevision.ca/chiefs/htmlen/cree/default.asp

Fine Day, Poundmaker's War Chief http://www.historytelevision.ca/chiefs/htmlen/cree/sp_fineday.asp

Big Bear
http://collections.ic.gc.ca/Alberta/fn_metis/bigbear_bio.html

http://www.geocities.com/SoHo/Atrium/4832/bear.html

The Indian View of the 1885 Uprising http://www.smokylake.com/history/native/indianview.htm

Big Bear poem http://home.earthlink.net/~sandiejohnson/bigbear.html

Big Bear's War Chief - Wandering Spirit http://www.carleton.ca/~jopp/1405f/jonish.txt

http://www.historytelevision.ca/chiefs/htmlen/cree/sp_wandering.asp

Battleford hangings - from the Saskatchwan Indian http://www.sicc.sk.ca/saskindian/a72jul05.htm

Canada: A People's History

Here are some of the episodes which deal with problems in the west from the Metis and first nations perspective.

Whiskey Trade

Buffalo Slaughter

Treaties

Anger in the West

Native Rights on the Prairies

Treaty Evolution http://www.ucalgary.ca/applied_history/tutor/firstnations/treaty.html

A Copy of Treaty 6 -http://www.ainc-inac.gc.ca/pr/trts/trty6_e.html Imagine you are a first nations person of this time - the language of this treaty would be difficult for any English speaking person to understand

Figure 3: Screenshot showing two of the web pages

Each topic led to a web page with links to pertinent information about that topic. Each of the five pages related to the student groups contained links to biography sites, descriptions of the conflict and primary source documents of interest to their group. Figure 3 shows an example of two of these web pages. On the page for the Metis perspective, you can see links to information about the battles fought during the rebellion, biographies of Riel and Dumont, letters and first hand accounts of events. The page also linked to those episodes in the website for Canada, a People's History that specifically discussed Metis issues. The page with links to information about video included a number of links to resources helpful in video production. A copy of the 2003 website is present on the accompanying CD.

PowerPoint presentation

Near the end of the eight class periods of research, the teacher requested that I prepare some type of summary that would tie together information from the videos and readings the students had already completed. I produced a PowerPoint timeline by combining two different timelines available on the web, one from the Northwest Resistance site at the University of Saskatchewan and one from the Midland Provisional Battalion site, adding pictures of notable people from the conflict, and highlighting the main events of the rebellion. Figure 4 shows two pages from this timeline.

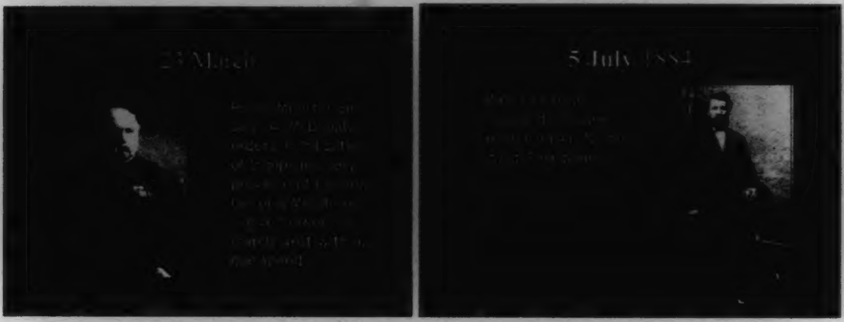
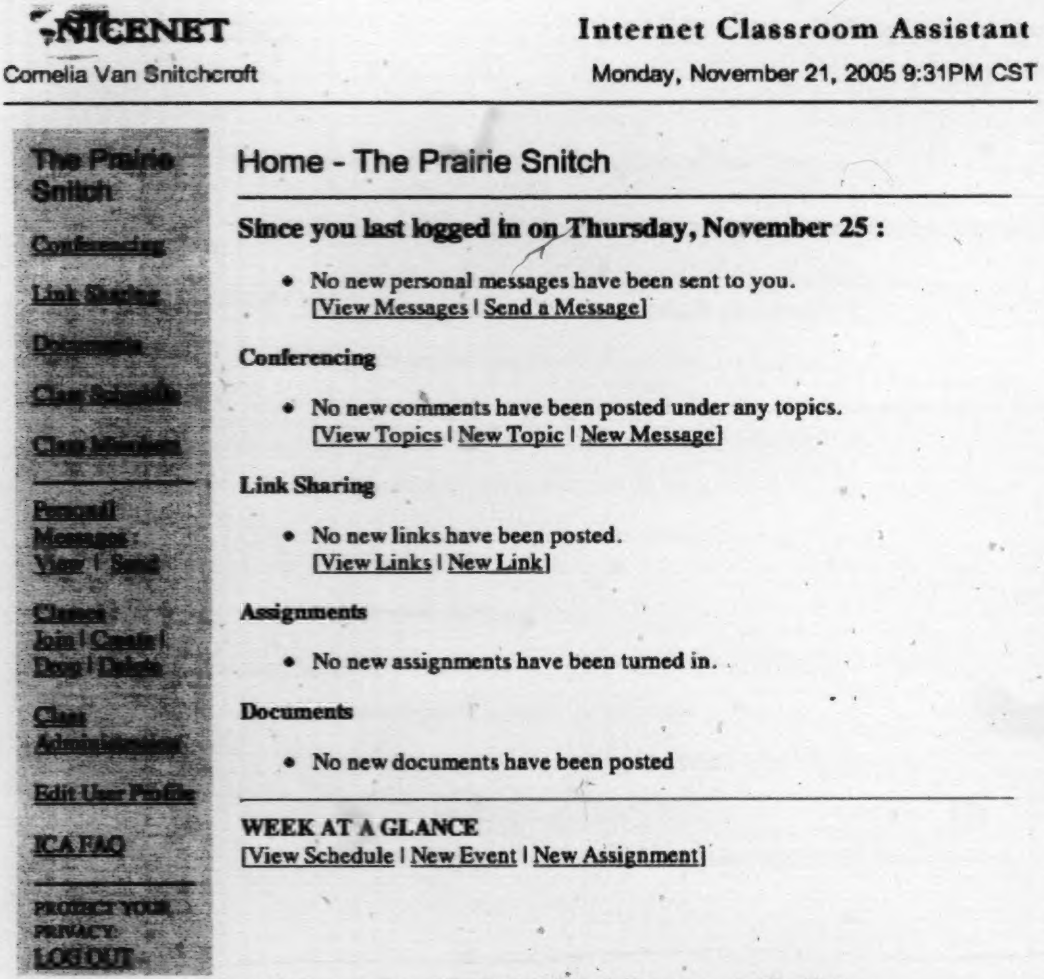


Figure 4: Screenshots from PowerPoint Timeline

Communication

We wanted the students to work cooperatively both in the classroom and outside the classroom, so we used a free computer messaging system called NiceNet Internet Classroom Assistant (http://www.NiceNet.org). A screenshot of our Prairie Snitch home page in NiceNet is shown in Figure 5.


NICENET
The Prairie Snitch
Conferencing
Link Sharing
Documents
Class Schedule
Class Members
Personal Messages : View | Send
Classes : Join | Create | Drop | Delete
Class Administration
Edit User Profile
ICA FAQ
PROTECT YOUR PRIVACY
LOG OUT

Internet Classroom Assistant

Cornelia Van Snitchcroft

Monday, November 21, 2005 9:31PM CST

Home - The Prairie Snitch

Since you last logged in on Thursday, November 25 :

- No new personal messages have been sent to you.
  [View Messages | Send a Message]

Conferencing

- No new comments have been posted under any topics.
  [View Topics | New Topic | New Message]

Link Sharing

- No new links have been posted.
  [View Links | New Link]

Assignments

- No new assignments have been turned in.

Documents

- No new documents have been posted

WEEK AT A GLANCE
[View Schedule | New Event | New Assignment]

Figure 5: Screen shot of the Prairie Snitch Homepage in NiceNet

NiceNet allows teachers to enter student names, post links to online resources, post assignments, and organize conference areas where students can post information. We set up five conference areas, corresponding to each of the groups: (a) White Settlers; b) Metis, c) First Nations; d) Government; e) Military/Police) so students could log in and read what other students in their group had discovered both at school and at home. We also had a sixth conference area called the Snitch Lounge where students could send personal messages to each other.

NiceNet also allows the teacher to post links to other websites and we used this capability to include some of the Internet sites that had originally been located in my Shaw webspace the year before. Locating links within NiceNet was advantageous because students only needed to know one short URL so whether they were at home or at school, they could quickly navigate to the Internet-based resources. NiceNet also included an area to post assignments, an area to post documents for students to read, and a peer-to-peer messaging system. NiceNet was very quick loading for slow Internet connections since it was completely text based.

Video Concepts

Treatment and Scripting

Students learned video concepts by analyzing three vignettes (Nellie McClung, Sitting Bull, Jacques Plante) from the CBC Heritage Minutes for concepts such as tone, pace, costumes, props, music, storyline, and framing of shots. This activity was designed to model expert practice in historical vignettes as well as to expose students to some video concepts they would need to consider during scripting.

With the help of a question sheet, the students viewed the three CBC Heritage Minutes clips and compared tone, pace, music and props. In this activity, students were divided into groups and watched for a different category in each movie. For example, if the first group looked at pace, the second group looked at music, costumes, props, and the third group looked at tone. Everyone looked for the storyline. Groups were assigned a different question for the second movie, and a different question again for the third movie. This meant that they only had to focus on one of the properties at a time and this seemed to encourage a deeper understanding of the ideas presented. One of the vignettes, Jacques Plante, was shown twice because this video was part of a lesson plan from Histori.ca and included a storyboard. We examined this storyboard to give the students an idea how a video was initially conceptualized. A treatment template the students needed to fill out for their video scaffolded this activity. You can find links to the instructional aids for this activity on the CD.

Camera Operation and Digital Editing Techniques

Concepts concerning camera operation and digital editing were taught using a CD on video concepts. The CD was a very comprehensive guide to video production and could very easily form the basis for a whole year's class in this topic. It was divided into the following areas: Camera, Lighting, Audio, Editing and Process.

To teach the mechanics of using iMovie, the digital editor, I updated the tutorials I had designed for Marie's project. While the topics, digitizing clips, editing clips, adding transitions, titles and credits remained the same, I had to redo these tutorials from the year before because a new version of iMovie had been released and the screenshots and the mechanics of some of the activities had changed.

Student Assignment

Figure 6 shows the assignment sheet given to the students. It demonstrates the tone we were attempting to foster in this project as well as providing an idea of the types of activities we asked the students to carry out.

Northwest Rebellion

History is a collection of viewpoints. Everyone sees an event from his or her own point of view, and that point of view is affected by things that have happened to them before in their lives. We are going to examine an important event in Canadian History, the Northwest Rebellion of 1885. In the late 1800's, many things were happening in this vast area we now know as Canada. Four provinces had finally joined together as Canada in 1867: Ontario, Quebec, Nova Scotia and New Brunswick. The huge fur trading company, the Hudson's Bay Company, was losing money in the fur trade and decided to sell its fur trading area, called Rupert's Land, to Canada. In 1871, British Columbia agreed to join Canada, on the condition that Canada would build a railroad from BC to the East. The French and English in Eastern Canada still had many issues that had been unresolved after the English defeated the French on the Plains of Abraham.

You belong to a team of investigative journalists for the newest newsmagazine in Western Canada, the **Prairie Snitch**. The editor of the Snitch needs you to ferret out the truth about the Northwest Rebellion of 1885 and write a hard hitting expose for your readers.

Here's the editor, Ms. Cornelia Van Snitchcroft (or Corny, for short). She's going to give you your assignments right now.

Corny: Hello everyone. Good to see you all again. Here's the scoop. I want to put together the best collection of news articles any magazine has ever seen and maybe even win us a Pulitzer Prize in the process. I hired you because you're the best and the brightest reporters I could find so I know you're going to do me proud and get the lowdown on what really happened back then in the Northwest Territories in 1885.

Now, down to the nitty gritty.

There's a lot of stuff to find out about, so I'm going to put you all in groups. That way you can divide up the work among you and really look at what happened from all the angles. There will be five teams of reporters and you'll be assigned to research one of the following groups of people who were involved in the conflict.

The teams are:

The Metis
The First Nations (formerly known as Indians or Aboriginals)
The Settlers
The Military (North West Mounted Police and the Soldiers)
The Canadian government and Eastern Canada

You'll need to look at books, diaries, videos, websites, and pictures to come up with your conclusions about the **"real"** story behind what happened.

As your editor, I need to see what you've found out every week so I expect regular reports from you about what happened back in the old West. You'll be filing your reports on the Snitch reporters' website. Read the instruction sheet on how to access it.

Before you start, you will need to decide what to include in your reports. You'll be looking at many pieces of evidence and some of the information might not be very credible. How will you decide what to include? What's the difference between a primary and a secondary source for information? How will you decide if a certain website, book, or video gives you reliable information?

Another thing you need to do is keep track of events. What are the dates and activities that occurred to the people you are finding out about? How will you keep track of these events as you research them? One way that historians use to keep track of events is called a timeline. As you find each event, write them down in order one below the other in a word processing document. After you have finished your research, we'll take all the events from all the teams, put them on cards and pin them to the timeline at the front of the room in the order that they occurred.

You have these assignments to complete while you are doing your research.

1. After every fact finding session, post a short report to the Snitch reporters' website to inform your fellow team members and myself about what you have learned.
2. Find out 5 *important* facts about (the) your group during the NW rebellion. These facts could include things like important events that happened to your group or issues that were important to your group. Make up 5 multiple choice questions about these facts (just like the questions they use in 'Who Wants to be a Millionaire?') and post them in the Challenge area of the Snitch reporters' website for your fellow students to answer. In a few weeks after everybody has had a chance to look at the questions and search for the answers, we'll have a tournament to see who knows the most about the conflict. Prizes given.
3. Script and act out a short dramatic episode to show why your group acted the way they did during the conflict. You might want to depict an event that occurred during the rebellion. It'll add some dramatic flair and human interest to our expose. Once you have scripted and rehearsed this episode, we'll videotape it for a special report to be aired on TV at the same time as our expose hits the streets in the magazine.
4. By now you should have a pretty good idea about the events and issues that were important for your group during the conflict. Choose a partner from your newsgathering team. The two of you will pick a historical figure from your group. Pretend that you have interviewed this person to find out how he/she was involved in the resistance, why he/she was involved, and what issues were important to him/her. You should ask about 5 questions that get at the important information about their involvement in the rebellion. (Don't ask questions that only require 1 word answers, ask questions that require your interviewee to explain things in detail) Once you have written your interview, get together with the other members of your news team to combine all three 3 interviews into a news report. This news report must then be filed in the documents section of the Snitch website.

There's one last activity that we'll be doing throughout our project. Just to keep you on your toes, about every third week we'll ask one person from each team to come to the front of the class and pretend to be a member of their group. For example, we'll ask one person from the Metis team to represent the Metis point

of view, one from the settlers team, one from the First Nations, and so on. We'll be choosing each of these people randomly from the teams, so you all need to have a pretty good idea of what was going on during the rebellion. If you read the news reports filed at the end of each fact-finding session, you should have a pretty good handle on the events, the issues, and the motivation of the people involved. We'll all be watching as you represent your group's point of view in the discussion.

Okay, newshounds, get to work!

Figure 6: Student assignment sheet, Year 1

Implementation Year 1

The Setting

Aspen Valley School is a small rural community school of over 500 students spanning kindergarten to grade 9 that serves an area of acreages and farmland. The elementary classrooms are self-contained with one grade per class. The junior high program has students circulating between classrooms with teachers acting as subject specialists. There are also alternative programs for students as well as individual programming for special needs students. All students are bussed to the school.

The school had two large Windows 2000 NT computer labs as well as computer workstations in the school library. The computer labs and library computers were connected to the Internet via a 56 Kilobyte dial up connection that seemed extremely slow compared to the high speed Internet connection on my home computer. The district provided technicians to manage problems with computers. Computers in these labs were set up by the technicians and then frozen to prevent tampering by students or unauthorized personnel. During this year, technicians were assigned to specific schools to manage their computer operations. Teachers could contact their assigned technician if there was a problem or they needed assistance, and technicians often had specified days that they would be present in the school. This was very helpful for me because, if we had a problem that affected the computers in the lab or a problem beyond my expertise, we could contact the technician and I could ensure I was present when she came to the school.

The classroom involved with the project was a large Grade eight classroom. The classroom itself was large and sunny, with five Windows-based computers at one side, two computers on the opposite side near the windows, and an LCD projector available.

The equipment was located in Lisa's classroom as a result of her participation in a previous innovative social studies project.

There were two grade 8 classes in the school. The lower functioning grade 8 students were placed in a 7/8 split and spent all their time in the same room. The teacher for this class taught these students all the time since it was felt they would be more successful if they didn't have to move around. I did not work with this group of students.

Lisa's class was composed of the students who were able to work more independently. The students in this class also reminded me of the Grade 8 students I had taught in that small town in Saskatchewan discussed in chapter 4. Just as in Marie's class, the first thing I noticed when entering the classroom was the wide range of variation in height amongst the students. There were a number of students, both male and female, who towered above me, and others who were not much taller than my ten year old grandson. Trying to infer socioeconomic status from students' dress is an impossibility in most junior high classes. The influence of Britney Speers was evident in the short t-shirts favored by many of the girls and the ragged rapper pants were popular with many of the boys. Other students were very well dressed, although the ubiquitous blue jeans were always common. As I came to know this class, it was evident that they were a very enthusiastic group. Although there were some students who were not that interested in the project and spent time fooling around rather than working, over half of the class were interested and worked diligently on the activities.

Initial Design Activities

After we decided on the topic, I spent some time collecting both online and paper-based resources. I searched the University of Alberta library for primary source documents. During my search, I discovered a large depository of information, both online and paper-based, housed at the University of Saskatchewan library so I contacted special collections for permission to include their information and made a trip to Saskatoon to copy some resources there. As I found material that referenced the rebellion, I developed a Filemaker database with the references and abstracts. We screened some video resources, most of which were quite dated and we examined some text-based resources from the district media library. I showed Lisa a description of a computer program called

'Making History' that I had discovered from the National Film Board and she ordered a copy. We decided to use sections of the video series 'Canada, a People's History' as one of our data sources.

We thought that the students would probably need a lot of time for research in our project, so we scheduled eight periods for research spread out once a week during January and February. After each day of research, students were asked to enter information they had gathered as messages into the NiceNet conference section for their group. During March, we allocated a contiguous block of time for the project, when we introduced video and scriptwriting concepts. The students then developed scripts, filmed and edited their movie. During April, we screened the movies in class.

Implementing the Project

On January 9th, we introduced the students to the project by giving them their assignments. In order to make the project more realistic, we decided the students should be investigative reporters for a newspaper called the Prairie Snitch. I acted as the editor, Cornelia Snitchcroft, and the teacher, Lisa, was the assistant editor, Ethyl Brown. Students were asked to choose one of the five groups that featured prominently in the North West Rebellion (White Settlers, Metis, First Nations, Government, Military/Police) with the end objective of developing a short video vignette about that group. We also explained that, at the end of each period, students should post a summary in NiceNet of the information they had learned that day. During the same period, we screened a video about Riel's early years and the events of the Manitoba rebellion from the video series 'Canada, a People's History'. At the end of the period, students were asked to identify first and second choices for which group they would like to research. Lisa then organized the 30 students into groups.

The first research class, January 16th, was plagued by network problems. The plan was to demonstrate the NiceNet conferencing area, have the students log in, leave a personal message introducing themselves to me in the Snitch café and begin checking out some pertinent sites in NiceNet's Links section. From my log entry of January 16, here is what happened:

> Got to school early, found out there was a server problem. Tried to log in to NiceNet, was unable at first but later got in to demonstrate. Also had to figure out how to use new projector in lab. Class was wild with a lot of delay due to trying to get in to demonstrate. Since we couldn't get in with the lab projector, we tried to use the classroom projector. Same problem but three of the six computers in the classroom were able to log in. Had students watch as these people registered in the class then logged in. Moved class to the lab and about three quarters eventually were able to log in to NiceNet, including myself this time. I demonstrated the conferencing area and the links area and we had the students who could log in write us messages in their team areas. The majority of the class was taken up with this process.
>
> Not a very auspicious start to the project – I sure hope things go better in the future classes or we will have to look at another way to communicate information. Most students worked productively but a few were playing pinball and one seemed to be trying to change parameters in the startup area (but might have just been a computer problem that came up on its own – don't know and didn't have time to follow up – trying to make sure everybody got logged in to NiceNet. Frustration level of the group was pretty high at times. Definitely need to do messages in word processor first to alleviate the problem of everyone trying to connect at once. I am wondering if it is realistic to use Internet for other sources as well. A local server solution or CDs with documents in them might be the way to go – paper another option.
>
> On the phone Lisa mentioned she had read over the introduction again with the class and she thought they were enthused about the project. I find them very hard to read - I'm so busy with all these technical problems that I don't have the time to get a feel for that part of the project at all. Hopefully next class we can get past techie things and on to actually learning something about the project. I wanted to spend some time exploring how to figure out good questions but didn't even get near that. Also didn't get to saving on student's own disk either. Feeling that really frazzled feeling I often had when working with a large group in the computer lab. Arghh! (Bonnie, Log, January 16, 2003)

When I expressed my frustration about what had happened Lisa recounted this story for me:

> Lisa: it's not the computer stuff, it's the Internet. I know it's the frustration that I had no idea about when I came to this school. The first year I was here I remember taking the grade 9's I had into the lab for the first time. And I had this wonderful site I wanted them all to go to. It was hell. I waited and waited and some of them never got on in the whole period. (Lisa, Interview, January 16, 2003)

The second research class, January 21, was plagued with similar network problems. Although I had logged in to the system successfully several minutes before class started, when I tried to log in at the beginning of class to demonstrate some more features in NiceNet, I was unable to connect. Students worked with the paper-based documents in the file box and made notes. In the last half of the class, students were able to connect and some posted their findings from the readings. From my log of that day:

> Having paper resources available alleviated some of the problems of students signing on to the Internet at the same time and overloading the system. System still seems flaky and keeps dropping signal for some reason. It took one student about 10 minutes to finally manage to get logged on. (Bonnie, Log, January 21, 2003)

The third research class, January 28, experienced yet another glitch. We had booked a TV and DVD player to show part of Canada, a People's History (CaPH), but when I arrived, the unit was unusable due to a flood in the AV room. Students spent the period accessing online resource links from my Shaw website. Before class began, Lisa and I had discussed the messages being saved in NiceNet. Lisa mentioned that she thought the notes students had taken about the videos were quite superficial. At the beginning of class she addressed this concern by telling students that we were hoping for notes that contained more than facts like birth date and death, that we wanted them to be watching for things such as causes of the rebellion, or a person's role in the conflict. After the class was over, I wrote myself this reflection:

> I need to design something that is self-contained to a very great extent – CD based or local website. I emailed the tech about a local server but she misunderstood and talked about proxy servers (but they don't have one anyway). It still wouldn't be a bad idea to print out a number of these web sites and put them in the paper box so that there isn't so much downtime waiting for NiceNet and web pages to appear. Internet speed is really a barrier. (Bonnie, Log, January 28, 2003)

The fourth research class, February 4, began with some scaffolding questions. Students were given some questions to think about and five minutes to discuss them with their group partners. Then we watched 'The Land of Discontent' (part of CaPH) and students entered their summaries in NiceNet.

My log reads:

> Class was more enthusiastic than last week's, people seemed to enjoy the video and some were able to pick out some perspectives. It will be interesting to see what gets posted as notes.

> I felt better about this session – students seemed more focused and everybody was doing something and were more focused as well. Seem to be quite comfortable in Snitch website compared to first sessions. Many are working in Word and cutting and pasting as well so computer skills seem to be good. (Bonnie, Log, February 4, 2003)

After school, Lisa and I tried to install the 'Making History' CD on one of her school computers. What a disappointment when we found out that it would not work with Windows 2000 workstations. I took it home to try it on my computer. It would not work with Mac OS X but I could install it on the OS 9 partition on my computer so I was able to gain access to some of the resources therein. What a shame we could not use it with students at the school! It was an excellent resource with many newspaper clippings, videos of actors portraying prominent figures from the rebellion, the minutes from many of the settlers' meetings (both white and Metis) from that era, and the text from Treaty 6. Another example of the downside of technology.

We talked about how to implement the first debriefing session. From my log:

> Then we talked about how to arrange the first catalyst video session. First, we talked about making it a role-play with each team representing a group. Lisa suggested maybe the whole class could be involved. Then we talked about making it a simulation of a copy editor's meeting where each team reports on what they've learned and how they will produce their video. Lisa liked that idea better so we decided to try that. Students at front in semi-circle with others watching. She will lead, as copy editor and I will observe.
>
> We talked about the project so far. She felt the students did look forward to this class but that many were not doing very much – and this was par for the course for some. She felt there was the problem of this being a long-term project – hard to keep the continuity from week to week but thought students were definitely positive about it. She also said to me, "after all, it is an experiment, isn't it?" and I agreed it was. So we felt it was okay to try things and modify based on how they worked. We are both unsure of what's the best way to do things, but willing to improvise. (Bonnie, Log, February 4, 2003)

The next class, February 11, we had our first and only debriefing session. One student from each group sat at the front of the classroom and discussed what their group had learned up to that time. While four of the group representatives were fairly well prepared, the fifth group had not chosen their representative until five minutes before the session started and had very little information about what their group had learned in their research. After the five representatives had spoken, the whole class had an opportunity to add any information they had found that seemed important or interesting.

The February 18th class was completely taken up with the Treatment activity discussed previously in Chapter 4. I noted in my log that we had enough time to show each of the videos twice and this would have given them time to pay more attention to details. One of the students remarked that the actors talked pretty fast. I decided I would revise the assignment for next time, showing each video twice, so that the first time through, they could concentrate just on the storyline, and then look for video concepts in the second showing.

The fifth research class on February 25th was divided between watching more video from CaPH and entering data in NiceNet. My log for that day reads:

> Just thinking about assignment #4 – the interview. How will we work that into the time we have? Need to talk that over with Lisa. I wonder if they have enough information to even be able to do that? Things need to be streamlined and shortened. Need more work on chronology and need to have all the resources in one form. I think it would be much better to have 2 or 3 readings that everyone in the group reads and discusses together rather than having everyone do something different. I think that might get the group starting to discuss things. Even the video at least gives them a common reference for discussion. This jigsaw thing is really hard to manage. I don't know how you get the students to start sharing and reading other entries. (Bonnie, Log, February 25, 2003)

Here are two of the NiceNet summaries that students posted as a result of viewing the CaPH video – it gives you an idea of the range of abilities in the class as well as how they conceptualized what they viewed:

> **SUBJECT:** movie Feb. 25
>
> i learned that louis real had of fights against the white people like at frog lake and other places the wars ended up with some people dead which the military or the Metis looked at there clothes and took what was needed. the Metis made theyre own ammo but soon ran out. the Metis were scared of big chief bear guy and the white milatary had more people which ment more weponds and the metitis people and louis snuk up behind and ambushed them. the milatary invented the gataling gun which left many dead. (Dan, 2003).
>
> --
>
> **SUBJECT:** The End of a Rebellion
>
> In 1884 Riel comes back for the United States. Macdonald watches him very carefully. In Red River Reil has a solid Metis base to support the rebellion. In

> December a petition is sent to Ottawa. Macdonald ignores the petition and throws away the last chance of Peace. Macdonald is more worried about the CPR going bankrupt. After the battle a[t] Duck Lake the settlers terminate their alliance with the Métis. Macdonald activates Militia. They use the railway to get to Red River. Troops are split into three columns. One is sent to Reil 's headquarters 's at Batoche. Battle commences and the Canadians win. Reil surrenders. Natives surrender soon after. (Darcy, 2003)

The sixth research class on March 5 was similar to the 25th, watching video from CaPH and entering data in NiceNet. While we had originally thought the students would develop the timeline themselves, in our discussion after class on the 5th, Lisa mentioned we needed to get things moving a bit more quickly and so I developed a timeline in PowerPoint. We reluctantly decided that we did not have enough time to have the students do their interview assignments (shown as assignment #4 in Figure 6, the student assignment sheet) so that assignment was dropped. Since none of the students posted any multiple choice questions in NiceNet (assignment #2 in Figure 6), that activity was dropped as well.

I presented the PowerPoint to the class on March 10th. During the same period on the 10th, I also gave the students part of a script we had developed in my university video class. The script was about rockets, and was written as a curriculum supplement for grade 6. It had student actors in one part and used several different techniques, including stop motion photography and silhouette actors to convey the information. I used it as an example of how a finished movie aligns with its script and to show how a video script is written.

March 11-13 the students picked a topic or vignette that occurred during the rebellion and began to design their video. Each group was required to fill in a treatment document and write a script as part of their project. Students were encouraged to keep their videos short, but they were not restricted to the one minute limit of the Heritage videos. We had verified with the English teacher that students from this class were familiar with script writing from their English class. Lisa and I moved from group to group watching the proceedings and helping students with suggestions for video topics. I noticed that students had a great deal of trouble trying to choose a topic for their video. Quite a bit of time in several groups was taken up with the decision of what event should be enacted. In a couple of groups, there was a fair bit of dissension surrounding choice for video topics. In several groups, either Lisa or myself would offer suggestions for events we thought might make good movies. Once students decided on their topics, script writing seemed to be much less problematic. Students needed to have their video scripts ready by Friday, March 14th. March 17th to 28th was the time set aside to shoot videos. Each group was allowed two afternoons for shooting. For example, Military began the afternoon of March 17th and completed their shoot on March 24th, during which time they were excused from their regular options classes.

Camera Operation and Digital Editing Techniques

Close to the time when video shooting was to commence, I took the groups separately during noon hours to run through the commercial video production tutorial on video concepts. Students huddled in a group around one of the classroom computers to watch the tutorials.

Digital editing was also difficult during this iteration. None of the computers in the school had a digital editor available and there were no public domain editors available for Windows 2000 workstations. We tried to use a public domain program called Muvee but discovered it would only capture the video but had no editing capabilities.

After having such a successful experience in Marie's class using iMovie on the Macintosh, I borrowed five Macintosh computers from the Faculty of Education at the university. I would have liked to borrow more, but logistically I didn't know how I could get them to the school. As well, they were in constant use by university classes. Only having five laptops – one per group – meant that students were quite restricted in the work they could do. Lisa and I decided it would be best if two students per group were trained to use the editing software. Lisa designated the students and they spent time at noon hours working through the iMovie tutorials on editing that I had designed. After filming was complete, the entire group decided which clips would be included and the trained students edited the final film.

Filming the Videos

When it was time for the students to begin shooting their videos, we moved into a special lab room. We had to schedule our two weeks of video production out of sync with the rest of the history curriculum in order to have access to this room. The two weeks in March were at the beginning of a new option cycle, and the teacher who was normally in this room was able to teach without the equipment in this room until the two weeks was up.

Students and the classroom teacher worked to set up a space to shoot our videos. We improvised a backdrop using surplus fabric from the lab. Our shooting schedule consisted of a two-week block where students were excused from their regular afternoon options classes. Each group had one afternoon to begin shooting their video. In the second week, each group had one extra afternoon to finish what they had begun the week before. Editing of the movie was done in the third week after the shooting was complete. Since most of the scripts involved using all the students all the time, I usually ran the camera. Directing was an informal activity that involved both the students and myself. Usually, the students would decide how they wanted the scene acted, and I would give directions to keep the students within the camera frame.

Final Presentations

Once the videos were finished, the students from each group presented them to their class. Each group came to the front of the room to discuss what they had learned about the rebellion from the project, and what they would do differently if they were to have another opportunity to work on the project. Most comments involved such things as more rehearsal before filming, as well as better props and acting. As I thought about these presentations afterwards, I recorded these thoughts:

> The presentations were rather interesting. The teacher had asked for three things to be presented – an introduction to the video, each student telling one thing they had learned from the project, and a discussion of what was good about their video and what needed to be improved. One group did a wonderful job of both the introduction and the presentation of what they had learned. It was obvious they had put time and effort into the presentation. I was impressed by how extensive their presentation was and can honestly say that their presentation had the depth of understanding and knowledge that I had hoped would be an outcome of this project.

> It was obvious that some groups had prepared, but one group, the military, had done very little beforehand. Students from this group took elements from the video they had just watched and used this to explain what they had learned. The other groups fell along a continuum between the extensive preparation of the First Nations and the almost total lack of preparation of the military. (Bonnie, Reflection, May 10, 2003)

Even though it was somewhat stressful for the students to have to do these presentations, the viewing of the videos was definitely a highlight of the project.

Formative Evaluation

Questionnaire

After the project was completed, we asked the students to fill out a questionnaire to evaluate it. We divided the questionnaire up into two sections, one section to evaluate the content aspects of the project, and one section to evaluate the video aspects. Table 2, following, shows the instructions we gave to the students on how to evaluate each component of the project and the statistical information we collected from their responses. In the discussion that follows the chart, if uncited, the quotes are anonymous comments from the questionnaire. Those quotes with citations are from the student interviews. Each student was interviewed once and the names are pseudonyms.

The Northwest Rebellion Project

In the two boxes in front of each activity, please place a number between 1 and 5 where 1 means a negative response, 3 means so-so and 5 means positive. For the first box, if an activity was really useful in helping you learn, put a 5. If it wasn't at all helpful, put a 1. In the second box, if you really liked the activity, put a 5, if you really disliked it, put a 1.

Part 1: Learning about North West Rebellion	**Helpful in learning about or making video**			**Enjoyed doing it**		
	average	**median**	**mode**	**average**	**median**	**mode**
Readings (links on web & articles in box)	3.6	4	4	3	3	3
Watching the video – Canada, a People's History	4.07	4	5	3.37	3	3
NiceNet – posting summaries	3.53	4	4	3.03	3	3
Debriefing session in front of class	3.29	3	4	3.18	3	3
Timeline presentation on PowerPoint	3.5	3	3	2.96	3	3

Table 2: Student Data from Part 1 2003 Questionnaire

The paragraph following the title in Table 2 shows the instructions we gave the students on how to fill out the questionnaire. By separating the question for helpfulness from the question for enjoyment, we hoped to get a more accurate idea of which components were the most helpful uncolored by how the student liked the activity.

It appears from our data that watching the CaPH video was most useful in learning about the rebellion, followed by readings. Student written comments concerning Part 1 of the questionnaire were limited. Two students mentioned the need for due dates on summaries in NiceNet; that suggestion was reiterated in the interviews. I think this comment came about because Lisa wanted to evaluate the NiceNet postings. The students spent a great deal of time doing this work and she wanted to recognize that effort. However, since some groups had individuals who spent a lot of time posting and others never posted at all, after the evaluation was completed students mentioned they felt they should have had more teacher supervision for this activity. In hindsight, I think we should not have evaluated this activity at all. The idea of the summaries posted in NiceNet was that of a communication device so that students could post information about what they had learned for all to read. It allowed students to find information from a variety of sources and communicate that information to their group-mates. However, when used as a source for assessment, it lost its authentic purpose.

Two students also commented about reading on the Internet saying "I find it easier to read things and information from books rather than on the Internet (don't have to wait for the Internet to load)," and "Internet is too slow. Books would be a better resource". When I questioned Bill during his the interview about reading off the Internet, he said:

> I find you can get more, like better information, like more realistic, some Internet web sites give false information. So books I find, that it takes less time. You open the book to that page and you read about it, where, Internet, it could take up to an hour, so I don't, I don't have good patience, so I find books a lot easier. (Bill, Interview, 2003)

One last comment about content concerned the format. One student said, "Instead of doing it every week, do it every day until done. This makes it easier to remember and focus on what we are doing." Another stated that we needed to have the research take place in a contiguous block, since students tended to forget what they had learned from one week to the next.

In the questionnaire, we also asked students about the video components of the project. Table 3 provides the results of that section.

Part 2: Video Production	**Helpful in learning about or making video**			**Enjoyed doing it**		
	average	**median**	**mode**	**average**	**median**	**mode**
Intro to video treatment (watching heritage minutes)	3.87	4	5	3.57	3.5	3
Writing script and treatment	3.83	4	4	3.2	3	3
Commercial CD on video & editing	3.87	4	4	3.7	4	5
Making Video	4.6	5	5	4.9	5	5
Editing Video	4.07	4	4	3.97	4	4

Table 3: Student Data from Part 2 2003 Questionnaire

As you can see from the results, making the video was the high point of the project and the only question where the responses for enjoyment were higher than those for helpfulness. As I was conducting the interviews there were many references to fun, so, when I was developing categories for analysis, I created one for fun to see how many times students mentioned the word. There are 28 occurrences of the word "fun" in my database from 13 interviews. As one student stated: "If you gotta learn, have fun" (Sara, Interview, 2003).

Comments on the other aspects of video production were mainly centered on the use of the commercial CD and editing. Three students mentioned that more people should get a chance to learn to edit. One said "When you only chose 2 people from each group to learn about editing, one person hogged the computer while learning how to edit. So that person only did all the editing, every one else watched", while another commented "Have more time to work on filming and everyone should learn how to edit". Two students stated that the commercial CD was not useful to them since they never ran the camera. As one student wrote: "I found that watching the CD, we never used the information given in the process of making our video, let alone remember what it said".

The majority of comments concerned time. Several students mentioned they would have liked more time for rehearsal and filming, with comments such as "I think we should have more time for making and editing movie", another stated "I would have like to have more time to film and edit so I wouldn't have felt so rushed" and finally, one student stated "To help this project be better would be more rehearsing time and better props would help". This suggestion was implemented in the second iteration.

Student Comments from Interviews

I conducted 13 interviews with students in spring of 2003 after the project was completed. Throughout the interviews, I asked students questions about the project, asking them to evaluate various components of the project. I also solicited suggestions for improvement. All students were interviewed once and their names are pseudonyms.

Not surprisingly, the students interviewed reiterated the themes discussed above. Time was a concern for many – they felt rushed during the video production and wanted more time to work on that component. Sara told me "Maybe if we had more time, cause we just had to do – like it would have been better if we could stay after school more and we'd get to do that more, I think" (Sara & Marcy, Interview, 2003). Three students mentioned more rehearsal time before the actual shooting commenced. As Bill (2003) stated "cooperation would have been better, more rehearsal, for doing our movie, rehearse a lot". Emma (2003) said "More rehearsal, better organization within my group as far as handing stuff in and everything". They also wanted better props for the video. Marcy said she wanted "better props because we had like drapes for backgrounds" and Bill told me "We didn't have proper props, like some of them weren't – like the tent, that was not called for".

Students mentioned the need for deadlines for parts of the project or due dates for summaries in NiceNet. Emma told me "We should probably get more organized, well not you and Mrs. T. but the actual groups. Give them due dates and stuff because I know we didn't have due dates for the summaries on NiceNet." In the interview with Sara and Marcy, due dates were mentioned. I probed further:

> Bonnie: You said something about a due date for summaries?
>
> Marcy: Oh yeah, because, yeah. Because we were like "When's this due?" and then you're, like, well, I don't know, and then we're, like, oh we won't worry about it. (Sara & Marcy, Interview, 2003)

Students also made a number of comments about group work and what they thought would improve the project if it were to be done again. Bill commented on the fact that his group goofed off a lot. When I asked him how that might be remedied, he stated: "Have a group leader, maybe. Someone that you think is cooperative and just good at making decisions. And make sure that they're on topic, so they're the group leader. Something like that might help" (Bill, Interview, 2003). Another student commented:

> It would be something that if I were able to do it again, I would because we could improve on the stuff that we should have improved on…like working together, having better props and a better story line and being more prepared because we weren't really prepared. We came in to do the skit with not even our real script. We just did it from the top of our heads. And that was mainly because the boys didn't do anything. I think if I were to do it again I'd be more well prepared and I know what to, what was going on than I did. Yeah, you have to compromise because it's more, if you do it on your own, like if you do like you're supposed to as an individual it helps, but if you don't work with the group and you don't compromise then it's not good either. So for the people who don't work well in a group it's not that good for them because it takes lots of teamwork to do it. It just depends who their group consists of, too. (Molly, Interview, 2003)

Various comments surfaced about group work and how students would change the process if they had it to do over. My feeling was that many of the groups were too large and that was why they tended to be dysfunctional. In most of the groups, with the exception of one (and that group only had one boy) the students often divided themselves into a group of boys and a group of girls and that seemed to cause some discord. Because of the dynamics of large groups, I specifically requested that the groups be no larger than four for the second iteration. Lisa and I decided that each group of four would research together and write the script and then we would pick the best scripts from each group and combine groups together to act them out.

There were positive comments about many of the components. Abby said "with the movie I did, it made us learn because we had to know ideas to make the scripts" (Abby, Interview, 2003). NiceNet summaries drew a number of comments. On the one hand, Molly replied when asked if they found making and posting the summaries useful:

> Yeah, but if you didn't take time and responsibility to read the other summaries then it was kind of a waste for some people because they didn't feel like they had to do it so . . . because there was lots of people who hardly did anything on there and they didn't read other people's. But it was good for people who had time to read it and stuff. (Molly, 2003)

Bill also echoed this idea:

> I think it was a good way if people used it to share. A lot of people just posted it and thought that was it, and they didn't say what they were doing, or what they were in charge of, so you didn't have a good understanding of their information. (Bill, Interview, 2003)

On the other hand, students were quite positive about writing summaries and said "posting summaries did help finalize what you remembered so you could implant it in my brain" (Vicky, Interview, 2003), and "the NiceNet posting was good, because everyone could post and then people could go and find out about it, so that was useful" (Alex, Interview, 2003). They also commended the site links in NiceNet, saying: "NiceNet was good because you had downloaded all the sites there so that they were all there for you and you didn't have to go look up sites. If you had to look up sites the information would be long" (Natalie, Interview, 2003).

The PowerPoint timeline was also credited as a means of helping students learn. Vicky told me:

> Vicky: I actually found most of it quite interesting, actually, and the way that we did it – it was fun but it also helped you learn, too.
>
> Bonnie: Explain to me what was the way that we did it that helped you to learn.
>
> Vicky: ….We were each separated into groups and we learned about each thing and in the end when you finalized it with the timeline it helped me to finalize my ideas – or where I learned and it helped me and I remember it now. (Vicky, Interview, 2003)

Marcy (2003) commented on the readings, saying: "I like all the stuff you brought in or whatever, that had all the information on those sheets like in little booklets you put in the folder". Another talked about the Heritage Minutes treatment exercise and commented:

> You told us what to do and you showed us a movie you made and you gave us stories about something else – that picture? [the storyboard] We weren't just told to make up a script, we were given direction on how to do that. And that's really helpful because – if you're just going to do something – you do what you think you're supposed to be doing but you're not quite sure – and it gave you more time to go see other groups so we knew what we were doing – it was very helpful. (Natalie, Interview, 2003)

When I asked the students to evaluate the project, I received some very interesting comments. One student had an interesting analysis of the reason she felt the project was beneficial:

> I also think it was more intriguing to them watching themselves playing it out and watching their friends – that, I think, helps because they're actually learning but they don't think they're learning, they're just into having fun watching it – so it's really good. (Molly, Interview, 2003)

Others commented on the depth of the project. Nick (2003) stated: "I learned a lot more than what we read in a book, because the book had half a chapter on it but it doesn't explain, it didn't get to what we did" while Alex said:

> It's interesting to find out about the rebellion because I never even knew that there was a rebellion in Canadian history but it's fun because you get to make a video of the stuff. It's interesting to find out the facts and to actually get to act it out and stuff. (Alex, Interview, 2003)

When I asked one student which project component was the most important, I heard: "finding out the information, finding out what really happened. Because you just think that back then it was just like it is now. But they had life a lot harder back then. Finding out what really happened is interesting" (Natalie, Interview, 2003).

I think Emma's summary comment seems to capture the spirit of what many were telling me:

> I think overall a good experience, though because we did learn stuff and we discovered skills – or we learned new skills that we didn't really know about before, like editing and stuff in the movies – our acting skills, we learned those and we also learned to laugh at ourselves, and laugh at others – with them though. And we learned from our mistakes and like bloopers. Yeah it was good. (Emma, Interview, 2003)

Teacher Comments

Lisa and I discussed the scheduling for the next iteration. She said: "I think I mentioned this earlier today, I think what we might consider doing next year is doing it all at once. So they're immersed in it, instead of once a week" (Lisa, Interview, May 29, 2003). This echoed student comments such as this one from Jake:

> Because it's like, just, switching back and forth from like, the time periods, from like 1812 and then 1885 was like. . .So, some of us say, if we just did it like straight in the area of the rebellion, if we just did it that time then it would have been easier to remember. (Jake, Interview, 2003)

We decided we would schedule the project to be contiguous in its next iteration. Commenting on the breadth of the project, Lisa stated:

> At the beginning, it was way too ambitious. I mean, we thought the kids would be doing – and even to me, and I know these kids, it seemed reasonable. It did. And looking back, and looking at how slowly these kids worked, and how long it took them to do everything, I just thought 'Holy Mackerel, I never thought that it would take as long as it did'. It's part of the learning process. (Lisa, Interview, April 8, 2003)

Since we only completed a fraction of the assignments we had originally planned to do, we pared the assignments down for the second iteration, leaving only the NiceNet postings, the interview, the script and the video.

Another discussion we had concerned the readings. When I suggested we might have to find readings that were shorter or at a lower reading level for slower readers, Lisa suggested:

> Even some of these things that you have on paper, highlight what they need to read as part of a reading, especially if it's a long one. You know, try and go through them ahead of time and just say, okay, read the highlighted parts as opposed to all of it. (Lisa, Interview, May 29, 2003)

I didn't implement this suggestion per se, but when I developed the website, I did cut many of the readings down by posting excerpts linked to individuals in the People section and linked to specific events in the Events area.

Lisa echoed the student sentiment about NiceNet, stating: "Thinking about the NiceNet posting – I think that that's a good thing also" (Lisa, Interview, May 29, 2003). We decided to continue using it for the next year. One change that I suggested concerning NiceNet was implemented in 2004. I felt it was a lot for the students to have to learn to use NiceNet at the same time they were also trying to conduct their research so we introduced NiceNet as a resource in the autumn geography project. In this way, students were technically comfortable with NiceNet before they started learning about the rebellion and it was less confusing during the project.

Overall, Lisa was positive about the outcome of this first iteration, as is evidenced by her comments:

> Just seeing the end product, I thought things must have gone well there because I thought that they turned out really quite well. The first time I saw them I was surprised. I did not expect them to be as good as they were. And for these kids not having done this kind of work before – first attempt, actually I could use the word, they looked fairly polished. They did. For the age group and for what they – the time frame they had to work with, I thought that it was good. (Lisa, Interview, May 29, 2003)

Given the restrictions we had to work with concerning Internet speed and lack of digital editing facilities, I felt the project was fairly successful on a number of fronts. The students were introduced to a much greater depth of information concerning the rebellion than the six pages of text that would normally have been their only information about the rebellion. The script writing and video production necessitated that students interact with the information and make it their own, causing them to learn some information at a greater depth. The idea of being an investigative reporter made the project somewhat more authentic. As Nick said when asked about being a reporter:

> It made some people more – they tried harder – cause I know some people who just kinda said 'Oh, we're on the net, let's play games' but some people figured, oh, a reporter, we might as well try hard and do our best. You wanted to find it in more depth and try to be the best reporter. (Nick, 2003)

Summary of Changes

A number of changes were made as a result of the formative evaluation for the second iteration. The first change involved the design of a comprehensive website for the project. This website was designed to provide a place where many of the disparate resources from the bare-bones links could be pulled together in one place. It also shortened some of the long readings by only including the portions needed for the project. It was visually more interesting than the text-based links of Year 1 and it included a map showing all the sites of interest during the rebellion. One area, Perspectives, was designed to highlight the multiple perspectives of people involved in the rebellion.

The second change involved the group composition. Lisa and I changed the content groups from five to three – Metis, First Nations, and Whites (the Whites encompassed the Settlers, Military and Government of the first year project). We changed the groups for several reasons. First, the perspectives of the settlers and the government were quite similar when it came to their perceptions of the First Nations and Metis in Saskatchewan. While I was able to find a lot of first-person material from the settlers' perspectives, it was very hard to find much demonstrating the government perspective. Most of the material from the military perspective involved descriptions of the conflict and both the teacher and I were trying to downplay the battles when writing scripts. We wanted the students to gain an understanding of the issues, and reading stories about battles did not further this objective.

Based on student feedback and our own observations, Lisa and I decided the groups would no larger than four members for script development. We made this change because we hoped the smaller groups would be more productive. Lisa and I had observed that some of the larger groups harbored one or two individuals who did not become involved in helping during the project. This was a bone of contention for students and something that was reported in the interviews. In order to ensure that all the students participated, we made the script writing groups smaller.

Based on comments by both Lisa and the students, the whole project, research as well as video production, was offered contiguously. We felt that offering the whole project at one time would allow the students to focus more intensely on the different sources of information being offered and keep the events more clearly in their minds. Because the project was being offered contiguously, we decided to drop one of the assignments from Year 1, the multiple choice assignment based on "Who Wants to be a Millionaire". Since it emphasized the collection of facts rather than higher thinking processes, we decided we would leave it out. We also discontinued the reporting activity described at the end of the assignment. This activity had been included when the students were only working on the project one day a week, as a way to keep the continuity from week to week. With students working full time on the project, we felt the summaries were no longer needed.

We introduced NiceNet to the students in the autumn when they were working on their geography project. This gave them some experience working in the lab and gave them familiarity with the site before we started working on the rebellion project, thereby lessening the new learning they had to do for the study.

Due to unfavorable student comments in Year 1, I decided not to use the commercial CD on video concepts. Instead, I found a brief Internet-based resource called "Tips for Making your Movie" that provided a short introduction to many of the concepts from the CD. As well, since this resource was available online, students would be able to use it from home and at other times, making it more useful in the future. Students also wanted to be more involved in the editing process, so instead of training two students per group using the iMovie tutorial, I decided to allow all students a chance to edit a section of the final video.

The chapter following will discuss the changes made to the project for Year 2 in greater detail, as well as explaining the website developed as a resource for the project. It will also discuss the implementation and formative evaluation of the project in Year 2.

CHAPTER 6: YEAR 2

Project Components

The second iteration of the North West Rebellion project was also carried out with Lisa at Aspen Valley School. It was composed of three elements: content acquisition, communication and video production. Following is a description of these components.

Content Acquisition

Resources provided to facilitate content acquisition included a comprehensive Northwest Rebellion website located on the school's server, a file box of photocopied articles, videos from Canada, A People's History, and a PowerPoint presentation highlighting the main events of the rebellion. The video resources and the PowerPoint presentation remained unchanged from Year 1. The file box was reorganized and the text-based website from Year 1 was modified substantially. These changes are discussed below.

The file box of photocopied articles.

The articles for the second year were organized into three categories of readings: a) Whites (the military, settlers and government information from Year 1), b) Metis, and c) First Nations. These categories paralleled the three groups Lisa and I had designated for the students this year. We collapsed the groups because the perspectives of the different white groups (settlers, military, NWMP) towards the First Nations and Metis were, in most cases, very similar and their stories overlapped to a great degree. We eliminated the government as a separate group because there was a lack of useful primary material about that perspective. The overview category from Year 1 was removed because it was included in the Timeline section of the rebellion website. Wherever possible, resources from the file box that were also available electronically were moved into the website in order to provide student access from both school and online at home.

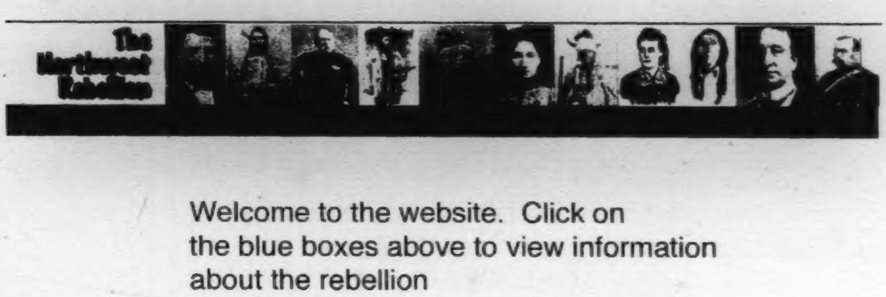
The majority of articles in the file box were descriptions of significant people involved in the rebellion made available as resources for the interview assignment. Many of the other primary articles in paper form from Year 1 were now made available in the North West Rebellion website. These included first hand accounts of events found on the web as well as newspaper articles, letters, and petitions from that time. A bibliography of the documents in the file box is available on the accompanying CD.

The Rebellion Website

I designed the website that accompanied this project to provide an easily accessible collection of resources about the North West Rebellion. It falls under the category of providing cognitive tools to scaffold learning (Jonassen, 1999). My goal in designing this resource was to develop a self-contained collection of information about the rebellion that would give the students the opportunity to act somewhat like a historian, examining primary resources, locating events in both chronological and geographical ways, and looking at events from different perspectives. I chose to package the information as a website because it would be accessible to students both at home (via the Internet) and at school (from their local network), and because web browsers, as opposed to authoring programs or software programs like Flash, are both cross-platform as well as freely available to any person with a computer and Internet connection and hopefully accessible for a number of years. With the exception of five flash buttons on the first page and a number of photos throughout the site, most of the site is text-based and loads very quickly on slow Internet connections. We encouraged students to access the website from the school's LAN when looking at it from the school's computers.

Whereas the website from Year 1 was basically just a set of links to information available on the web, the Year 2 website was designed to be a comprehensive resource. Descriptions of events that happened during the rebellion now reside within the website. Many of the people famous during the rebellion are represented on the website. The text from quite a few primary documents are reproduced on this website.

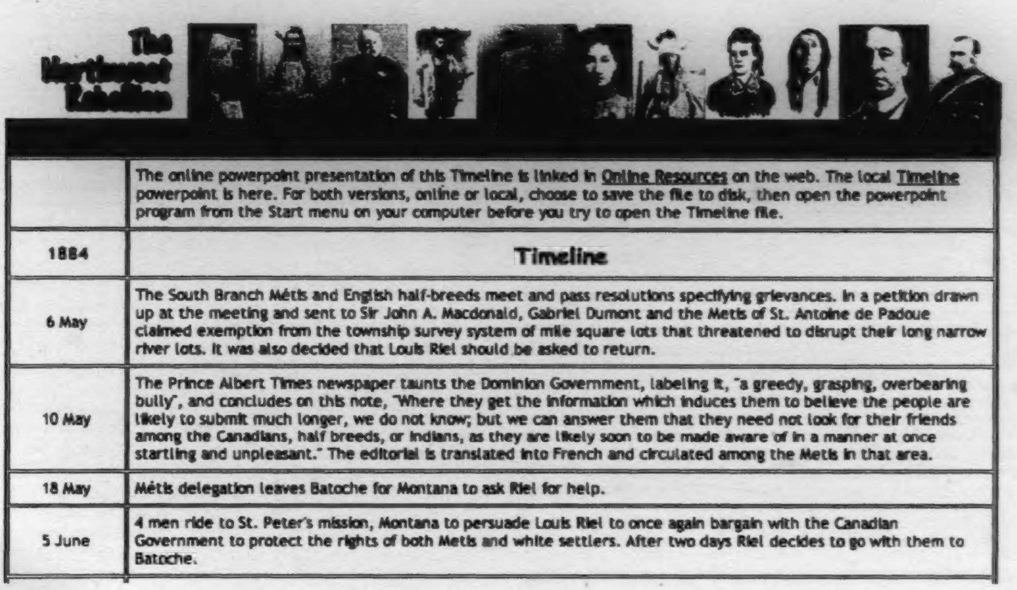
The website can be viewed on the accompanying CD by choosing Rebellion from the left menu.



Welcome to the website. Click on the blue boxes above to view information about the rebellion

Figure 7: Homepage of North West Rebellion Website

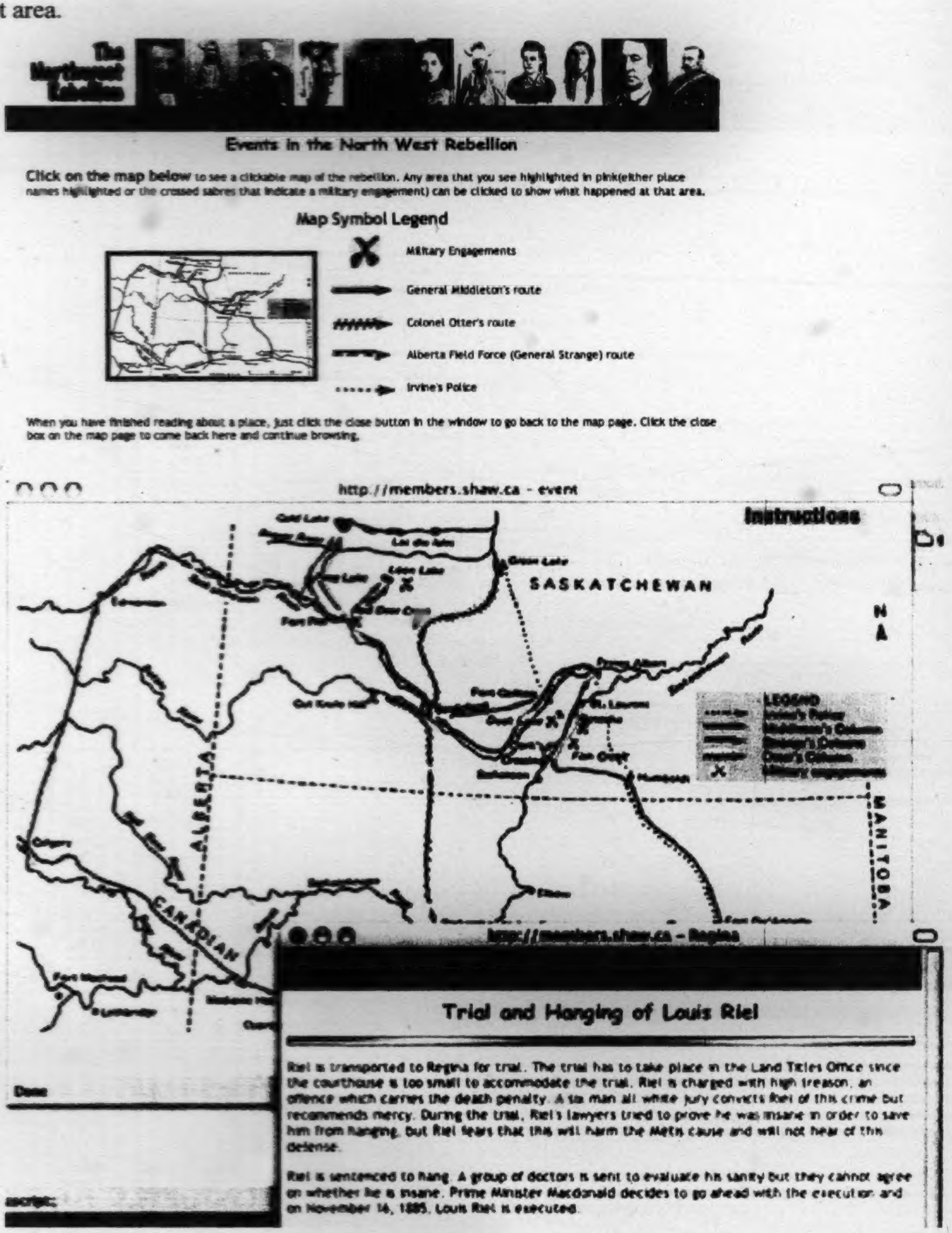
The website included six different areas: Timeline, Events, People, Perspectives, Primary Sources and Web Links. Figure 7 shows the home page for the site. The first area, shown in Figure 8, was the timeline and included a text-based timeline of the rebellion. The timeline area also included a link to a downloadable PowerPoint timeline with the same information plus photos and maps.



	The online powerpoint presentation of this Timeline is linked in Online Resources on the web. The local Timeline powerpoint is here. For both versions, online or local, choose to save the file to disk, then open the powerpoint program from the Start menu on your computer before you try to open the Timeline file.
1884	**Timeline**
6 May	The South Branch Métis and English half-breeds meet and pass resolutions specifying grievances. In a petition drawn up at the meeting and sent to Sir John A. Macdonald, Gabriel Dumont and the Metis of St. Antoine de Padoue claimed exemption from the township survey system of mile square lots that threatened to disrupt their long narrow river lots. It was also decided that Louis Riel should be asked to return.
10 May	The Prince Albert Times newspaper taunts the Dominion Government, labeling it, "a greedy, grasping, overbearing bully", and concludes on this note, "Where they get the information which induces them to believe the people are likely to submit much longer, we do not know; but we can answer them that they need not look for their friends among the Canadians, half breeds, or Indians, as they are likely soon to be made aware of in a manner at once startling and unpleasant." The editorial is translated into French and circulated among the Metis in that area.
18 May	Métis delegation leaves Batoche for Montana to ask Riel for help.
5 June	4 men ride to St. Peter's mission, Montana to persuade Louis Riel to once again bargain with the Canadian Government to protect the rights of both Metis and white settlers. After two days Riel decides to go with them to Batoche.

Figure 8: Rebellion Website – Timeline Area

The second area, Events, contained an interactive map of events that occurred during the rebellion. Clicking on the small map below displayed a large map of the conflict area.



Events in the North West Rebellion

Click on the map below to see a clickable map of the rebellion. Any area that you see highlighted in pink(either place names highlighted or the crossed sabres that indicate a military engagement) can be clicked to show what happened at that area.

Map Symbol Legend

- ✕ Military Engagements
- ➡ General Middleton's route
- ➡ Colonel Otter's route
- ➡ Alberta Field Force (General Strange) route
- ⋯➡ Irvine's Police

When you have finished reading about a place, just click the close button in the window to go back to the map page. Click the close box on the map page to come back here and continue browsing.

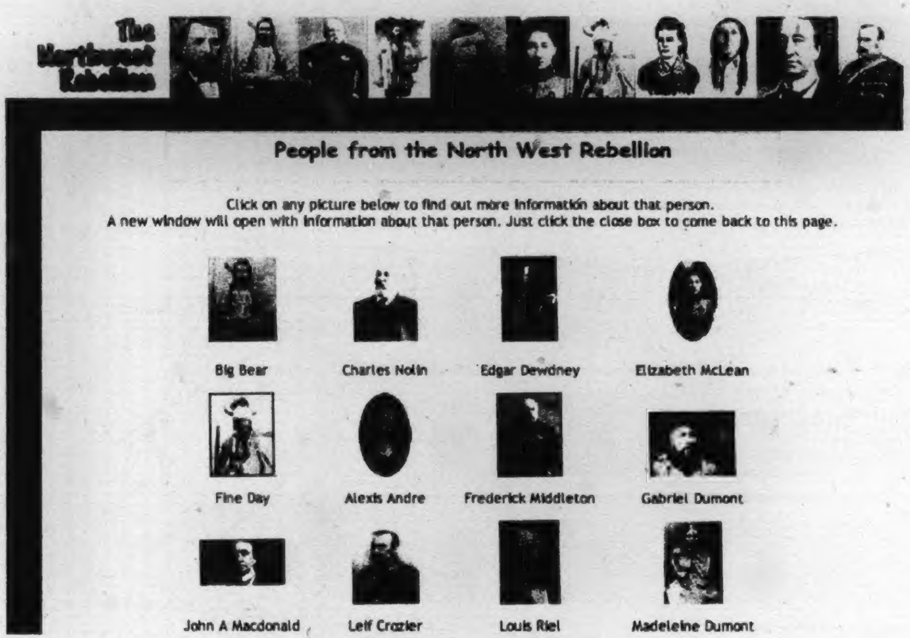
Trial and Hanging of Louis Riel

Riel is transported to Regina for trial. The trial has to take place in the Land Titles Office since the courthouse is too small to accommodate the trial. Riel is charged with high treason, an offence which carries the death penalty. A six man all white jury convicts Riel of this crime but recommends mercy. During the trial, Riel's lawyers tried to prove he was insane in order to save him from hanging, but Riel fears that this will harm the Metis cause and will not hear of this defense.

Riel is sentenced to hang. A group of doctors is sent to evaluate his sanity but they cannot agree on whether he is insane. Prime Minister Macdonald decides to go ahead with the execution and on November 16, 1885, Louis Riel is executed.

Figure 9: Large interactive map with small pop-up window

The map included all the battles and places where significant events occurred during the conflict. When you clicked on an area of the map, a small pop-up window appeared that told you some information about that event. Figure 9 illustrates this sequence.


The Northwest Rebellion

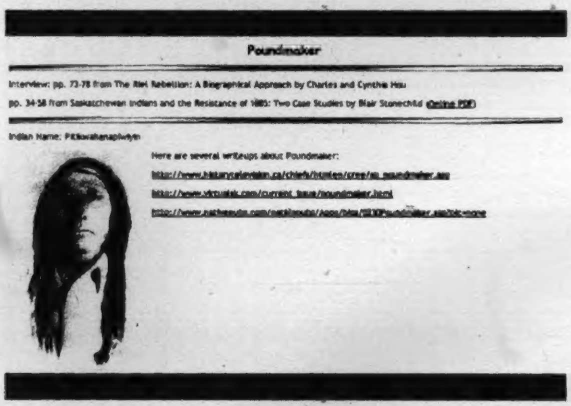
People from the North West Rebellion

Click on any picture below to find out more information about that person.
A new window will open with information about that person. Just click the close box to come back to this page.

Big Bear
Charles Nolin
Edgar Dewdney
Elizabeth McLean
Fine Day
Alexis Andre
Frederick Middleton
Gabriel Dumont
John A Macdonald
Leif Crozier
Louis Riel
Madeleine Dumont

Figure 10: Rebellion Website – People area

The third area, People, represented by Figure 10, showed pictures and provides descriptions of many individuals who either figured prominently in the rebellion, or wrote accounts of their experiences. Figure 11 shows Poundmaker's page.



Poundmaker

Interview: pp. 73-78 from The Riel Rebellion: A Biographical Approach by Charles and Cynthia Hou

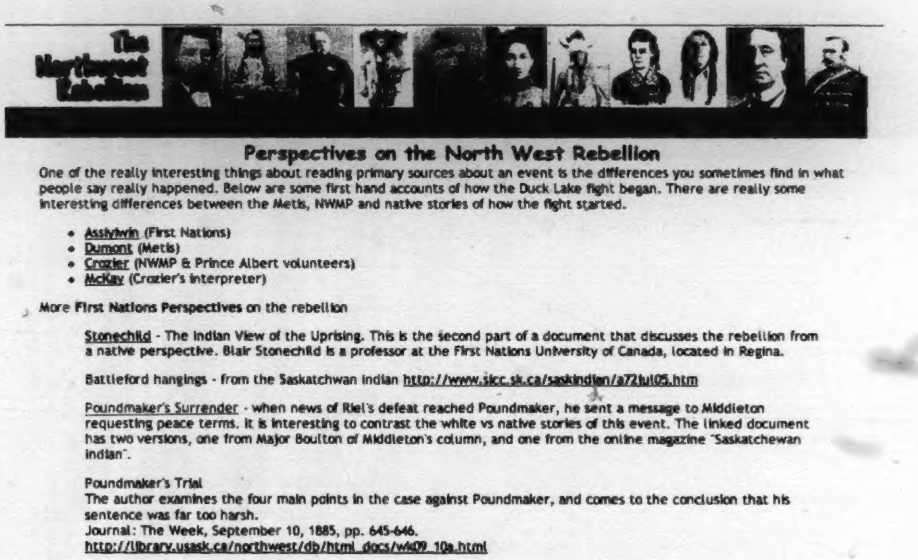
pp. 34-58 from Saskatchewan Indians and the Resistance of 1885: Two Case Studies by Blair Stonechild (Online PDF)

Indian Name: Pitikwahanapiwiyin

Here are several writeups about Poundmaker:

Figure 11: Screen shot of Poundmaker's information

The book *The Riel Rebellion: A Biographical Approach* by Charles and Cynthia Hou, provided information about many of the people shown on the People web page.



Perspectives on the North West Rebellion

One of the really interesting things about reading primary sources about an event is the differences you sometimes find in what people say really happened. Below are some first hand accounts of how the Duck Lake fight began. There are really some interesting differences between the Metis, NWMP and native stories of how the fight started.

- Assiyiwin (First Nations)
- Dumont (Metis)
- Crozier (NWMP & Prince Albert volunteers)
- McKay (Crozier's interpreter)

More **First Nations Perspectives** on the rebellion

Stonechild - The Indian View of the Uprising. This is the second part of a document that discusses the rebellion from a native perspective. Blair Stonechild is a professor at the First Nations University of Canada, located in Regina.

Battleford hangings - from the Saskatchwan Indian http://www.sicc.sk.ca/saskindian/a72jul05.htm

Poundmaker's Surrender - when news of Riel's defeat reached Poundmaker, he sent a message to Middleton requesting peace terms. It is interesting to contrast the white vs native stories of this event. The linked document has two versions, one from Major Boulton of Middleton's column, and one from the online magazine "Saskatchewan Indian".

Poundmaker's Trial
The author examines the four main points in the case against Poundmaker, and comes to the conclusion that his sentence was far too harsh.
Journal: The Week, September 10, 1885, pp. 645-646.
http://library.usask.ca/northwest/db/html_docs/wk09_10a.html

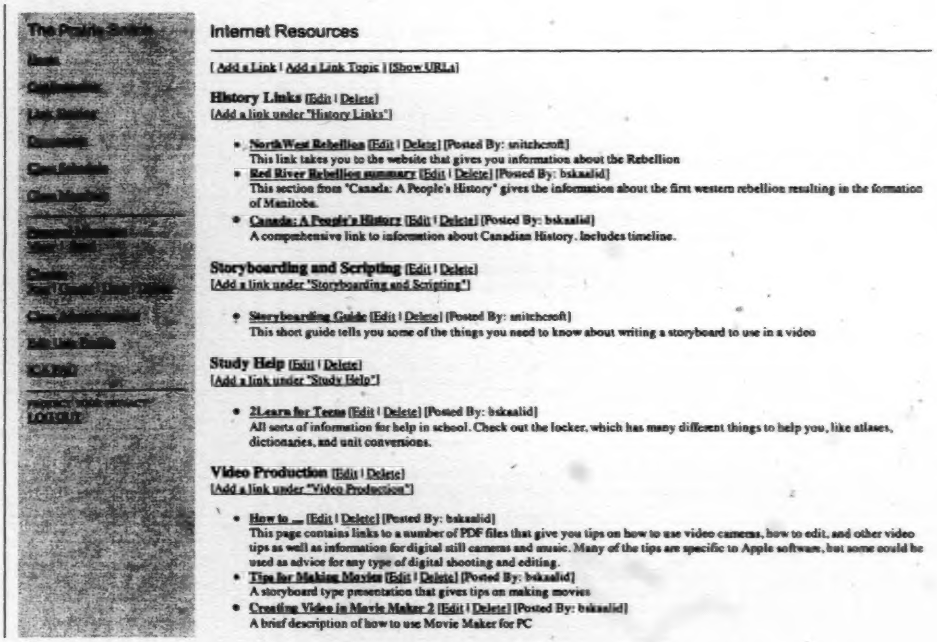
Figure 12: Rebellion Website – Perspectives area

The fourth area, Perspectives, represented in Figure 12, showed some of the conflicting stories about the rebellion. When I developed this section, I wanted to show the radically different perspectives about what had occurred, hoping that students would be able to see the events from the different perspectives.

The fifth area, titled Primary Sources, included petitions, letters, meeting minutes and newspaper articles from the time period. The sixth area, titled Web Links, provided a collection of links to information about the rebellion that I thought were useful, well written or provided more perspective. Links to the website on Canada, a People's History, First Nations perspectives, government documents and a link to Riel's trial provided still more information. As you can see from the description above, the different areas of the website match the content goals listed for the project. These goals included: a) students should learn about a topic as a historian would doing things such as the examination of primary documents or the construction of timelines; b) students should understand that history is not a given: there is interpretation involved in all historical accounts; c) students should understand that multiple perspectives are present for historical events; and d) students should understand that dominant history is usually written by winners and they need to understand whose voices are empowered and whose are silenced. By examining some of the documents available in this website, students could read primary documents from the perspective of other groups than the dominant majority. They could even read about the same event, for example, the skirmish at Duck Lake, from different perspectives.

Communication

As stated previously, we wanted the students to work cooperatively both in the classroom and outside the classroom, so we used NiceNet once again. We set up three conference areas, corresponding to each of the groups: (a) Whites; b) Metis, and c) First Nations so students could log in and read what other students in their group had discovered both at school and at home.



Internet Resources

[Add a Link | Add a Link Topic | [Show URLs]

History Links [Edit | Delete]
[Add a link under "History Links"]

- NorthWest Rebellion [Edit | Delete] [Posted By: snitchcroft]
  This link takes you to the website that gives you information about the Rebellion
- Red River Rebellion summary [Edit | Delete] [Posted By: bskaalid]
  This section from "Canada: A People's History" gives the information about the first western rebellion resulting in the formation of Manitoba.
- Canada: A People's History [Edit | Delete] [Posted By: bskaalid]
  A comprehensive link to information about Canadian History. Includes timeline.

Storyboarding and Scripting [Edit | Delete]
[Add a link under "Storyboarding and Scripting"]

- Storyboarding Guide [Edit | Delete] [Posted By: snitchcroft]
  This short guide tells you some of the things you need to know about writing a storyboard to use in a video

Study Help [Edit | Delete]
[Add a link under "Study Help"]

- 2Learn for Teens [Edit | Delete] [Posted By: bskaalid]
  All sorts of information for help in school. Check out the locker, which has many different things to help you, like atlases, dictionaries, and unit conversions.

Video Production [Edit | Delete]
[Add a link under "Video Production"]

- How to ... [Edit | Delete] [Posted By: bskaalid]
  This page contains links to a number of PDF files that give you tips on how to use video cameras, how to edit, and other video tips as well as information for digital still cameras and music. Many of the tips are specific to Apple software, but some could be used as advice for any type of digital shooting and editing.
- Tips for Making Movies [Edit | Delete] [Posted By: bskaalid]
  A storyboard type presentation that gives tips on making movies
- Creating Video in Movie Maker 2 [Edit | Delete] [Posted By: bskaalid]
  A brief description of how to use Movie Maker for PC

Figure 13: Screenshot of the Link Sharing area of NiceNet

As in the previous year, we also had a fourth conference area called the Snitch Lounge where students could send personal messages to each other. Two other conference areas were added for this iteration. One area, Summaries of Rebellion, was designated as the place where students could post their summaries of information from the CaPH videos. The other area was created for students to post their scripts.

NiceNet also allows the teacher to post links to other websites and I used this capability to include those Internet sites on video production we had used the year before, as well as links to the Canada, a People's History website and a link to my North West Rebellion website online. Locating links within NiceNet was advantageous because students only needed to know one short URL so whether they were at home or at school, they could quickly navigate to the Internet-based resources. Figure 13 provides a screenshot of the links area in NiceNet.

Video Concepts

Treatment and Scripting

Based on how the activity had worked in Year 1, I changed this activity slightly. Instead of viewing three vignettes, I had the students view five (Nellie McClung, Disaster at Halifax, Sitting Bull, Jacques Plante, and Sam Steele) from the CBC Heritage Minutes for concepts such as tone, pace, costumes, props, music, storyline, and framing of shots. This activity was designed to model expert practice in historical vignettes as well as to expose students to some video concepts they would need to consider during scripting.

With the help of a question sheet, the students viewed the five CBC Heritage Minutes clips and compared tone, pace, music, props and screen shots. First, I had the students view all five vignettes, one after another. I wanted them to understand the storyline of each vignette and maybe get a feel for the difference in ambiance and pacing before they had to concentrate on analysis. Then I rewound the tape to the beginning and had them analyze each vignette in depth. This time, students watched for a different category in each movie. For example, if they looked at pace in the first movie, they would look at music in the second, costumes and props in the third, tone in the fourth, and shot changes in the fifth. This meant that they only had to focus on one of the properties at a time and seemed to encourage a deeper understanding of the ideas presented.

Why did I make these changes? I played the videos twice because students in Year 1 had mentioned it was difficult to keep track of the story and attend to their video concept at the same time. By showing the videos twice, I simplified the cognitive load for the students since they could concentrate just on story and dialogue the first time through, and then look for their assigned video concept the second time through. I showed five vignettes instead of three because it allowed me to show a variety of concepts: fast vs. slow pace, serious vs. more light-hearted, older vs. more recent, and a variety of topics such as politics, native conflict, and hockey. It also made for easier implementation for the teacher because I could assign topics to a whole row at a time, making it easier for me to know which row was responsible for answering a specific question during class discussion.

The students and I also examined the accompanying storyboard for Jacques Plante to give them an idea how a video was initially conceptualized. A treatment template the students filled out for their video scaffolded this activity. You can find instructional aids for this activity on the CD in the Year 2 Treatment section.

Video Production

Based on student feedback from Year 1, neither the commercial CD on video production nor the iMovie tutorial was used as instructional aids in this iteration of the project. To introduce some ideas about movie production, I used a web-based aid from the Apple website entitled 'Tips for Making Your Movie' found at http://www.apple.com/education/solutions/ilife/movietips/ .

Student Assignment

The assignment sheet was similar to the one included in Chapter 5 with two changes. First, the number of groups was changed to three groups: Whites (including information from the Military/NWMP and government from the year before, First Nations and Metis. The number of assignments was significantly reduced for this iteration. We asked the students to write NiceNet summaries of what they had learned from watching the videos or reading about their group's part in the rebellion. We also assigned the interview assignment and the video vignette from Year 1. The wording of these three assignments was identical to those in Year 1 and may be reviewed in chapter

5. All the resources used for this iteration of the project can be found in the CD accompanying this document.

Implementation, Year 2

During this iteration, Lisa was also teaching a split grade 7/8 class and wanted these grade eight students to be included as well. There were twelve grade 8 students in the split grade who participated in the project, plus 27 students in the other grade 8 class. Unlike the schedule of the grade 8 classes from the first year, both classes circulated throughout the school, moving from teacher to teacher. To accommodate this change, most of the students in the split grade were placed in that class because of their strong academic skills and because they were able to work more independently. These students often worked on projects by themselves while the teacher lectured the grade 7 group. Although compliant and easy to work with, the students in the split class did not show a lot of enthusiasm for the project. The full class of grade 8 students had a large number of weaker students and many of these students found the complexity of a constructivist learning environment quite challenging. Although there were some students in the full class who were quite excited about the project, many in the class seemed apathetic and indifferent when the project was introduced. Compared to the students from Year 1, as a whole, the students in the second iteration were markedly less enthusiastic about the project.

Changes in the Setting – Computer Procedures

The school division technology assistance procedures were changed for this school year. No one technician was assigned to any school, instead, teachers and administrators would send an email to the Help desk at division office and the next available technician would be dispatched for assistance. This was especially problematic for me because there was no set schedule for technical assistance, so, if we were having a problem in the classroom, I was never usually there to explain what was needed. For instance, it took from October until January to resolve a problem with Lisa's classroom computers because I was never there when the technician was. As well, there was very little assistance available for about the first two months of the school year because the technicians were swamped dealing with virus problems.

The computer lab remained basically the same as the previous year, but Lisa was given a new teacher workstation. Her previous teacher workstation was changed over to a dual Windows 2000 NT/Windows XP student workstation. In XP mode, we would be able to use it for digital editing. This presented problems when using this dual configuration computer because students were unable to access their network accounts from XP. If students wanted to access their computer accounts on the school network they would have to log in to Windows 2000 NT at the start of the login procedure. They could not switch between XP (needed for video editing) and Windows 2000 NT (needed for their file storage and networked software) without logging out and back in.

For this iteration, I had hoped to have some students trained in camera operation and digital editing before the project began. To do this, we started a video club in the first term. This club was first run at noon hour, but the free time at noon is only around 35 minutes and that was too little time. We moved the club to an after-school slot once a week for several months, beginning in October and stopping before Christmas. We had intended to continue in the New Year, but stormy weather and other commitments on my part made that impossible. Lisa did not feel comfortable carrying on in my absence, so the club was not as successful as I had hoped. However, several of the students from the split class did learn camera techniques and operated cameras during the production of their videos, and the lone video-club student from the large class was the director-camera operator for her group's video.

The idea behind the video club was to gain experience with the Windows digital editing environment and several students did learn to operate Windows Movie Maker 2. However, it was quite confusing to use as well as being unwieldy and slow compared to the Mac's iMovie software. The editor was also unavailable during school hours because it was located in Lisa's classroom. We tried to acquire a cart in order to move that computer around, but that did not happen. Since the Macintosh editor was of much higher quality, simpler to use, and accessible outside of the classroom (because I brought my Mac laptop for that use), I decided to stick with it for the final video editing of the vignettes.

My other objective for the video club was to familiarize Lisa with the software in the hopes that she would feel comfortable in continuing the project once I was no longer around. Although she watched when the students were using the software, she never tried it for herself. In the final debriefing, when I asked her about the project and what she would try on her own, she said:

> I don't think that I would make movies, I don't. I just don't feel like I have the confidence to pull that off. And just because of the things that I just told you, like I don't know how to do editing, I really don't know how to – I've never really operated a video camera, even on my own time, with my own family. I just haven't done it. So I don't have the background to pull this off. (Lisa, Interview, April 8, 2003)

Implementing the Project

In a manner similar to the year before, students were asked to be investigative reporters and research information about the North West Rebellion. The assignments for this year included a simulated interview with a person from the time, short summaries of information learned from the CaPH videos that needed to be entered in their group area in NiceNet, and a short video presentation of an event from that time. These revised assignments can be found in the CD in Year 2. Goals for the project remained the same as Year 1. As previously described, groups for this year included: a) Whites (which included some of the resources from government and military/police from the year before as well as the settlers; b) Metis, and c) First Nations.

As a result of our decision to have the students work in smaller groups, all the groups from both classes had four, or at the most, five members. This meant that the 7/8 class wrote three scripts, while the large grade 8 class wrote six scripts (two for Whites, two for Metis and two for First Nations). At the end of the script writing process, the 7/8 class picked two scripts for filming and the students from the third script were divided between the other two groups. In the large class, we chose one script from Whites, one from Metis and one from First Nations to be presented. Students from the unsuccessful White, Metis or First Nations group also acted in the video with their successful counterparts.

The project started on February 20th for the split class. They watched the video about Riel and the Red River Rebellion and were given time to enter information about what they had seen in NiceNet. They were also assigned pages about the rebellion in their textbook. They had a bit of time at the end of class to read and then it was given as homework. Informal checking in the next class indicated that very few students did the reading at home. Students were also told to choose groups for Monday.

Here is what my log said:

> First class of project for Riel. Students watched video of birth of Manitoba, took notes went to computer lab began to enter summary into NiceNet. Didn't have enough time to complete entry. Some talking during video but mostly attentive. Entries are factual only. When I first arrived this morning, Lisa points out that ppt is only for NWRebellion so we need to start with video of Red River – she talks to students about project and points out although it is factual material, there is always some bias to every story. She puts students into groups by alphabetical order – works pretty well with one girl in each group. When we go to computer lab students cluster in one area – too crowded so I move one group over. One fellow is ignoring his group completely, logs in and starts to play a game. I make him shut down and sit between other two members – so he bugs his other group members. Rest of groups work productively – one student talks about Métis killed with rock but completely forgets about T Scott. I think that's due to difference in presentation – rock is graphic but they just heard the shot for Scott. Lisa comes in to say it's time to shut down. Asks students to read second reading in text for Monday. Tells them they need to decide what group they want to examine – Metis, natives, whites. Have first and second choice ready for Monday. Talk about interpretation of events – bias in the presentation. When first arrived I was surprised about groups of three – thought we were doing pairs – turns out threes were for ppt. After class we have a quick discussion and change back to twos on my request. We changed back to twos for next group which is much larger with more actors. That way less problems with discipline I hope. Lisa says we use first group as guinea pigs, laughingly she also mentions here it is the first day and we're already making changes in the schedule. (Bonnie, Log, February 20, 2004)

Monday February 23rd, the split class students read through the PowerPoint presentation in the computer lab. In my attempt to make the project more constructivist, I wanted the students to access the presentation individually rather than having me presenting it to the whole class. However, this did not turn out to be a good idea and I heard many students complain about the amount of reading they had to do. I also showed students how to access the rebellion website which had been placed on their local network. Some students ignored the PowerPoint and the website and sent personal messages to each other. One pair of students spent the period cutting and pasting pictures from the people section of the rebellion website into word processing documents. From my log:

> Lisa took them back to class early to give pep talk and point out that they need to do reading when in lab – she said she had impression that they felt comp lab was free time. Not free time, need to do research in order to complete interviews and make videos. She also talked about the evolving process of this project, how lucky the students were to have this extensive web site whereas last year we didn't have this kind of a resource all in one place. (Bonnie, Log, February 23, 2004)

In the afternoon, the full class started watching the Red River Rebellion. These students also wrote summaries for NiceNet and picked groups for the videos. I was unable to pay much attention to what went on in that class because, just as class started, the computer technician showed up to fix the computers inside the classroom that had been unable to access the local version of the website due to a setting inside Internet Explorer.

The next two classes were spent watching the movies and writing summaries for NiceNet. On February 24th, I wrote:

> I thought about entries in NiceNet and came up with suggestion for change. Instead of everybody posting, had groups watch video from their perspective and post a summary just as if they were reporters putting together a story. Suggested the change to Lisa and she thought that sounded good so we did that. Introduced the video by asking the students to think about their task as that of an investigative journalist who is looking for information. They should think about it as they are interviewing people from their perspective. We divided up the sections and wrote the section names on the board as well as which group they mostly represented. We also decided what to do with one student who was going to be away for two weeks and redistributed students to come up with 8 FN, 9 M and 10 W in order to have pairs for the interviews. I introduced the video by talking about the section that we didn't have time to show about the whiskey traders and then we watched the video. Stopped 10 mins. early and students went into groups to put together their NiceNet summaries. Due to time constraints, not enough time to post. I wandered around and talked with groups about what they had found important. Suggested to Metis that it was important that they lost their land to speculators and Riel's religious fanaticism "prophet of new world"
>
> Wonder about my role as teacher vs. researcher. Probably shouldn't be doing what I did in terms of guiding students to important points as I did above. (Bonnie, Log, February 24, 2004)

The February 25th class went as follows:

> 7/8 class – Lisa assigned a short paragraph about the NW rebellion to be posted to NiceNet. We discuss organizational details about how to work with student who will be away – they end up deciding to do 2 interviews between 3 of them. Grade 8's watch video while teacher and gr 7 leave room – after video is over students move into groups to start writing paragraphs. One student asks if she can use the book to make her summary and states that her notes don't help her with writing the paragraph. I try to guide them about how to do the paragraph by asking them about things they have seen – I ask "Why were the Indians upset, why were the settlers upset?" – C says dishonest advertising (good answer) but I try to get them to focus as well on the idea of colony and what that means to the settlers and why are the Metis unhappy. Then I mention they can also add the events that happened as well. Again I am overstepping my role as observer but I feel I must help if asked. The participant observer paradox, I guess. Again, never enough time for anything – students do not get their paragraphs done in class but have time next class to finish and post. We decide we will give out the interviews for students to take home and read so they can start assignment on Monday. Have two days to finish it. (Bonnie, Log, February 25, 2004)

Large class: The students are watching the movie, and I am watching for clues as to how the teacher guides them. Lisa interjects, "that's important, natives have no food; that name's probably important – Crozier".

> During the movie we talk about how we are going to set up the groups for script writing and how to introduce the project – I wanted to make sure that the journalist idea was put across to them for the realistic task. At the end of the movie, the teacher points out two things that were stated, one that the rebellion could have been avoided, and the other about how the rebellion initially created a way to bring the country together. She also pointed out that the Canadians mostly referred to whites in Ontario. Then the students moved into their groups to write their paragraph. At one point the teacher says, we need to move into fast mode here. (Bonnie, Log, February 25, 2004)

On February 25th, I arrived early to class to find Lisa queuing a movie for the grade 7 portion of the split grade class. After the movie began, she took the grade 8's out into the hallway to talk about the interview assignment. It went as follows:

> We read over the writeup for the Snitch project – I read the part which sounded like it was from the editor then gave the paper back to her for the assignments. Initial write-up talks about a bit of background history which they hadn't covered yet – also talked about perspective – she mentioned that this was something they had talked a lot about. Also talked about primary and secondary sources of information and what they meant. They tried to extrapolate from what primary

> and secondary industry meant to get the idea. Talked a bit about questions – Lisa mentioned that the 5 questions required in the assignment were questions that had to have a fairly extensive answer – i.e. not like Where did it happen? Duck Lake.
>
> Students were not at all interested in the assignment – just another bunch of answering questions for them. I didn't see any type of buy-in or enthusiasm. No excitement. Students walked back to the room to work on their summaries from last class to post on NiceNet. Some still writing, others started to enter info on computer. B couldn't get logged in so had to work with E. Lisa worked with A to help him get some information on paper for his write-up. Lisa distributed the articles for the interviews and students started to read the articles. S read his article because C had the write-up at home and he wasn't at school today. Students worked at their projects, but did not show a lot of enthusiasm for what they were doing. (Bonnie, Log, February 26, 2004)

In between the two Grade 8 social studies classes I had to wait two and one-half hours before the second class began. I would go to the staff room, write my research notes, eat lunch and wait for the afternoon class. Shortly before the second class was to start, Lisa came to talk to me in the staffroom. She expressed her concern that the project was behind schedule and asked if we could skip the interviews altogether. I could sense her frustration in that the students were accomplishing very little and agreed that there was not enough time to do both the interviews and the video. We actually assigned the interviews to the second class as well, in the hopes that the students might get some information and ideas about topics for the videos, but then cancelled the assignment during the following class and started into the video topics instead.

The March 1st class introduced video editing concepts. This activity modeled expert practice in historical vignettes and exposed students to some video concepts they would need to consider during scripting. Since this activity is described in detail in the project description at the beginning of this chapter, I will not repeat it here. By the end of this activity, I felt students had a fairly good understanding of the things that needed to be addressed when developing a video.

After the students had worked through this activity, they were given time to pick a topic or vignette that occurred during the rebellion and began to design their video. Each group was required to fill in a treatment document and write a script as part of their project. Students from this iteration had not received instruction on script writing from their English class, but we did not discover this information until after they started to develop their scripts. To counter this deficiency, I posted several video scripts on the school LAN and had the students view them before they began to write their own scripts.

March 2nd we viewed a short presentation from the Apple website on making movies entitled "Tips for Making Your Movie". The tips included suggestions for framing shots and preparing for movie making. When I presented it to the split class, I took them into the computer lab. Although the pages were black and white cartoons and should have loaded fairly quickly, it took such a long time to load each page that students were reading their emails in between pages. Since the delay would have been even greater for the full class, I spent the noon hour downloading each page and saving it on the network area for the class. In the afternoon, I showed each page to the students just like a presentation.

On March 4th, students worked on their scripts. Lisa and I circulated throughout the groups. Here are some observations from my log:

> I start with group in the hall. They have a pretty good idea of what they are going to do and lots of first hand documents to use. It's frustrating though because no one has read anything. They are brainstorming ideas for how to set up the scene. I show them places to look for dialogue and information. They are on task when I am there, don't know what occurs when I'm not but they do seem to be getting somewhere and have ideas.
>
> Second group is the group who wants to do something with military. It's difficult because they can't do the battle but they want to do something about soldiers – group is all male. I have made a number of suggestions for things they can do but they have decided to work on the Loon Lake skirmish and release of the prisoners. They obviously haven't read any of the resources I gave them because they don't know the details at all. I finally end up reading a section of Elizabeth McLean's story about how they were rescued to give them some ideas. It looks like they find it hard to do unstructured things.
>
> Third group are like clams – they shut right up as soon as I come near – they are very belligerent whenever I ask them questions. They show me a paper with words on it but won't (or can't) tell me the gist of what they have put down. One boy in particular is always doing things to bug others, including me, such as pinching the girl beside him, poking her, making rude noises. It is this student who wants to bring a whiskey bottle to school as a prop for writing a petition. He asks me if he can bring it (but it will smell like whiskey – one girl says he will have to wash it). I dodge that question and tell him to ask the teacher.
>
> I circulate among the groups telling them general things about scriptwriting such as stage directions and how to handle the narrator in the video. In one group I mention that they should consider how to handle the narrator by putting some action such as the dance in the video we watched this morning. One student

> suggests we can just put the narrator over black. I suggest that is a bit boring and they might want to have a scene to look at instead. Teacher comes over and tells students they should have script written by end of Monday. I don't think it will happen but you never know.
>
> End of period shows some progress but not a lot of concrete things written down. Most seem to have some idea of what they are doing. (Bonnie, Log, March 4, 2004)

On March 5th they had an hour presentation by a live actor who represented Louis Riel. The actor, who was dressed as Riel, talked in the first person about various events that had occurred in Riel's life. After his presentation was complete, students were given time to ask questions. The questions could pertain to Riel, or to his life as an actor. They did not ask many questions, and most were about acting. The students appeared to enjoy the presentation.

On March 8th and 9th the majority of the groups finished their scripts. On the10th the 7/8 class had to pitch their scripts to the class. There were three scripts written for 12 students, but we were only going to film two of the scripts so we needed to eliminate one. Here is what I said about the process:

> Today in first class we had pitches. Each group had to say why their script was the one that should have been acted out. The first group, the Metis, had quite a good script, but didn't do a very good job of selling it to the others. The FN group had a topic everyone seemed interested in, plus they did an excellent job of explaining why it should be presented. The other group, the hostage group didn't do that great a job of pitching, but I think their topic, NWMP rescuing the hostages, was more appealing as well. After voting, the group went with the NWMP and FN scripts. The third group was split between the other two, and they both went out in the hall to start planning their productions. I talked with both groups and told them to decide whom their director should be. I mentioned that directing a movie is not a cooperative thing and one person needed to be in charge. (Bonnie, Log, March 10, 2004)

In the full class, one script for Whites and one script for First Nations were not finished, so we went with the two scripts that were done. The two Metis scripts were finished, so Lisa took those two groups to another room for pitches and they decided which one they wanted to produce. All students whose scripts were not enacted became part of the other group with the same topic when the videos were produced. This meant the five students from the Metis group whose script was not chosen for production became actors in the Metis video along with those whose script was selected, and so on for the other two groups.

March 11th was a day for rehearsal. Each of the three groups took their scripts and found a different area in the school to practice. One group was having a great deal of difficulty acting out their play because no one could decide who was the director. They would nominate someone, then ignore him or her when they tried to direct. When I walked out into the hall, they were shouting at each other quite loudly. I tried to calm them down and then had them decide on a person they would all take direction from.

From March 16th to 22nd the students filmed their videos. Lisa arranged with the other teachers to release the students from their regular classes and each group had one full day to complete their video. All of the groups were finished taping before the school day was over and we spent the afternoon viewing clips and editing the videos.

Digital Editing

We only had one Macintosh laptop available for digital editing this year. After the taping was complete, the clips were downloaded to this computer. The whole cast watched the clips, and decided which ones were to be included in the final movie, and which could be relegated to blooper status. Bloopers were a big part of the process for these students – they had as much fun watching them as the actual video selections. I then took students, usually in twos or threes, and had them edit parts of the video under my supervision. I tried to ensure that all the students had a chance to work on the movie, either by creating titles, editing clips, making credits, adding sound effects or editing the bloopers at the end. It would have been better to use the school computer so that students would have become familiar with the technology available at the school, but the computer was stationary in the classroom so editing would have had to occur at noon, after school or else during class time, which would have disrupted Lisa's classes. Although the students did not work independently as in Marie's class, I did try to ensure that every student who did want to try editing was allowed a chance to contribute to the final video. Of the 27 students in the full class, 21 students wanted to participate in the editing while all the students were involved in editing the video in the split class.

Formative Evaluation

Questionnaire

As in Year 1, we distributed a questionnaire asking the students their opinions about the various components of the project. These results are shown in Table 4 and 5 following. When I made up the questionnaire, I forgot to add a section for the actor who portrayed Riel so this element of the project was not evaluated. All comments quoted are anonymous.

Similar to Year 1, it appears that students felt watching the CaPH videos was the most helpful activity in the project, followed by the interview readings and the information found in the rebellion website. As in Year 1, we had one comment about reading off the computer screen: "Reading off the computer is difficult and annoying because of the glow. Booklets, handouts and the textbook were much better and the information more readily stayed in my mind. More hard copies and less computer reading would be helpful".

The Northwest Rebellion Project

In the two boxes in front of each activity, please place a number between 1 and 5 where 1 means a negative response, 3 means so-so and 5 means positive. For the first box, if an activity was really useful in helping you learn, put a 5. If it wasn't at all helpful, put a 1. In the second box, if you really liked the activity, put a 5, if you really disliked it, put a 1.

Part 1: Learning about North West Rebellion	**Helpful in learning about or making video**			**Enjoyed doing it**		
	average	**median**	**mode**	**average**	**median**	**mode**
Timeline on PowerPoint	3.42	3	3	2.42	2	2
Textbook reading	3.76	4	5	2.52	3	3
Watching the video – Canada, a People's History	4.31	5	5	4.1	5	5
Rebellion website	3.53	4	4	2.92	3	3
NiceNet – posting summaries	2.32	2	2	2.55	2	2
Readings about people involved in rebellion for interview assignment	3.68	4	4	2.87	3	3

Table 4: Student Data from Part 1 2004 Questionnaire

Similar to Year 1, there were comments about lack of time for script writing, practicing and editing. There were very few specific comments that referenced this resources section with the exception of two students. One said: "We did not as a group work on NiceNet so I did not learn anything. The PowerPoint and other reading was pointless because I dislike reading" while the other stated, "Stop using NiceNet". Similar to Year 1, the majority of comments concerned the video portion of the project.

Part 2: Video Production	**Helpful in learning about or making video**			**Enjoyed doing it**		
	average	**median**	**mode**	**average**	**median**	**mode**
Intro to video treatment (watching heritage minutes)	3.87	4	4	3.73	4	5
Writing script and treatment	3.83	4	4	3.17	3	3
Making Video	4.42	5	5	4.77	5	5
Editing Video	4.4	5	5	4.25	5	5

Table 5: Student Data from Part 2 2004 Questionnaire

In the questionnaire, we also asked students about the video components of the project. Table 5 shows the results of that section. Students suggested that the videos should be longer, saying, "being able to make a little bit longer video". One student mentioned the space for filming should have been larger, saying "I think if you could get a bigger space to film in, that would be good, 'cause some of our shots with things in the background didn't work out". Another student said "Some suggestions on how to make the project better are to give the groups more time to practice for the video, the class could maybe do more hands on activities and maybe we could go through the reading as a class to understand it better".

Three students thought that there was too much interference from the supervisor (me). One said "More independence when making and editing the film". Another suggested:

> I think it would have been easier if just the students were working on the video because we found several of our shots were compromised and it took a long time explaining what we were looking for in the shot and the script.

Two students talked about group composition, one stating "First, put the people together in the group instead of choosing which script to pick. This way the group members all know what the play's about and can understand from that point of view" while the second commented "Instead of splitting up groups in the groups of Metis, whites and natives just leave them in one group so they can do the script as one whole group instead of picking the best script". This refers to the fact that, in order to keep the groups small, we kept the script writing groups small and combined the groups when making the videos. Students felt they did not understand the script very well since they had not been present in the group when it was written.

Another comment concerned group behavior during the video:

> Find some way to make people settle down. Half our time was wasted dead air from people messing around. One person should be assigned camera and unless being supervised by that person no one else should touch it. That caused lots of wasted film.

Students also commented on the overall project. One stated "Do more projects, like the interview, where we can act like we are in the time of the rebellion". Two students thought more hands on activities would have improved the project, while another thought it needed more creative ways to learn things. One felt more research was needed.

Students also had some positive comments that included "It all was really good. The video was fun to make and was a fun way to get us to research the events" and "The project was good as it was".

Student Comments from Interviews

I conducted 17 interviews with students in spring of 2004 after the project was completed. Throughout the interviews, I asked students questions about the project, asking them to evaluate various components of the project. I also solicited suggestions for improvement. All students were interviewed once and their names are pseudonyms.

Student comments were very similar to the year before. A number of students requested more time for the various components: script writing, rehearsing, and the actual video production. Since they all got a chance to do part of the editing, this was one area that no one commented about.

Of the ten students who made comments about the readings used for the interviews, most were positive about reading them and thought they learned a lot about the time from them, even though they never did complete the actual assignment. Tom told me "reading about the people who were actually in the thing was helpful because then I could learn about those people and what they did because I didn't have a clue about what any of them did" (Tom, Interview, 2004).

Technical problems with logging in to NiceNet were mentioned by three students. Zach commented "And NiceNet, I never really looked on there because I can't really get on there that good" (Zach, Interview, 2004). As with the previous year, students commented that it was not that useful an assignment if no one read what others had posted. Marie told me "if you're, like, going to post things on NiceNet, many people don't really read them. Like, they didn't have time to read them. So, it would be, like, more learning if we read them, instead of just posting them" (Marie, Interview, 2004).

Lisa and I were both disappointed in the way NiceNet turned out this time. Since all the research was done in a very short time, students posted very little information in NiceNet this iteration. The only area of NiceNet that was used appreciably this time around was the Snitch lounge where students sent personal messages to each other.

The North West Rebellion website was mentioned favorably a number of times in interviews. When I asked what they liked about it, comments included "The website was pretty good… they were nicely categorized. And the map was neat, you could just click on the people or events that happened" (Rachel, Interview, 2004) and

> because it showed you what happened, like the map, for example, showed you where the battles occurred. And it had a biography of the people which you could understand, who they were, what their points of views were, and it helped you understand the events which occurred. (Ethan, Interview, 2004)

Sam suggested it needed biographies of more people, but could not tell me whom to add. A number of students told me they used the website to find events for their script and that it was fast going because of the way it was categorized.

Students were ambivalent about the PowerPoint timeline. Many liked it, some thought it was boring after a while, and several disliked it because they had to read it off the screen as evidenced by this comment: "I didn't like the PowerPoint because I found it really difficult to sit there and read off of a computer screen and have that information stick in my mind. I didn't remember anything from that" (Rachel, Interview, 2004).

Writing the script was not as well received as the last year. Kathy (Interview, 2004) said "writing the script was good. I think it was easier since we had a group" but the majority did not indicate they enjoyed that activity. While this may have been affected by the fact that students were not familiar with script writing from their English class, no one specifically mentioned anything about it.

The textbook was also a source of information for several students. Rachel stated, "Reading out of the textbook I find is pretty good for me" (Rachel, Interview, 2004). Kathy also found the textbook very useful, saying:

> Kathy: then the textbook was really straightforward. So it taught me a lot.
>
> Bonnie: so, straightforward compared to what?
>
> Kathy: um, well, when you have to, like, decipher stuff, like from the Internet you have to figure out if that stuff is what you need or not. And from the textbook it's like, that's really what you need.
>
> B: so you like the summaries in the textbook?
>
> Kathy: Yeah. (Kathy, Interview, 2004)

One student suggested the way to improve the project was to expand on the idea of using actors to recreate different perspectives from the rebellion. He told me:

> Maybe bring in – you know that Louis Riel guy – the actor guy that came in? If we had one of those, I think that would, to make it better, to help you learn more, is to bring in and do that a couple more times, and get perspectives from everybody's point of view. Like, you'd have a Metis person, which would be Riel, a major person, then you could have a native person to help and a white person, you'd have one from each section and only your section would go and watch this, maybe, [okay] and you'd learn and take notes about what happened, what was their personal part in this, how did they take this, and then the next group will go and they'll learn about a main character from theirs. And maybe they can form memory around that. (Troy, Interview, 2004)

When I asked the students for their evaluation of the project as a whole, most were quite positive. Sam said "I don't think I'd really change that much, it's pretty good", while Zach stated:

> The project was fun, it had lots of – I think it was really well done. Um, it could have been a little bit more structured, in the fact that I think that it should have been that we had more days to do our script and not push the time to do it. But that worked out in the end, so yeah, it was good.
>
> Zach went on to say:
>
> the video really helped too, the video really clicked it all together. I never really knew what – like I knew what we were doing but as soon as we did the movie it helped me that much more to understand what we were doing.
>
> It was a good project and I hope that everyone else gets a chance to do it because, me personally, it really helped me learn about the Northwest rebellion and the test

> that we're going to have tomorrow. I'm going to think back on that movie and know that it helped me and I'm going to probably get some answers because of that movie. It was a really good experience and I enjoyed doing it. (Zach, Interview, 2004)

Teacher Evaluation and Suggested Changes

When I asked Lisa for her evaluation of the project, she began by focusing on the lack of time:

> the weakness I think is that we tried to do too much in the length of time that we had. . . . we ended up not doing the interview part because we realized that the amount of time that it was going to take to write the scripts and shoot the movies and get everything edited was just going to be long enough without doing interviews as well. And I don't really think it's a weakness of the project but it's just because we are limited by time. I think that if you didn't have to worry about time, to keep those parts of the project probably would have been better. Like it would have given the students a little bit more background if we would have done that interview. (Lisa, Interview, April 27, 2004)

She continued by saying, "I don't know, I don't think there really was any weaknesses that made it flawed. I think it was a good project. I think that it's interesting, I think it's a good way for the students to learn" (Lisa, Interview, April 27, 2004).

I asked what she would change if she were to do the project again. She replied:

> Posting on NiceNet – looking back on that one, I think we probably rushed through that too and didn't really give the students enough opportunity to do that justice. I think you could do a lot more with that, [right] as far as having the kids communicate with each other via the NiceNet. Lets see. I really like the interview idea. I think I would do that again. Or I would do it for the first time because we didn't actually do it. Yeah, I like that idea of the two students working together. (Lisa, Interview, April 27, 2004)

As we talked further about the project, I asked Lisa:

> Bonnie: Was there a difference in the amount of depth they were able to go into from a normal activity in your history unit?
>
> Lisa: Definitely a difference in the amount of depth they could [go into].
>
> Bonnie: Was it worthwhile to give them the opportunity to go into this depth?
>
> Lisa: **Yes** (*emphatically*) I think so. Especially for those students who really got into it, as some kids do. (Lisa, Interview, April 27, 2004)

My understanding from this interview was that Lisa was happy with the project for this year as well, although we both felt that these students lacked motivation compared to the previous year. Lisa told me:

> Last year, and see, I think it's part of the dynamics of the group too; last year I felt better about how much time we spent on it because I really felt that those kids learned more than this group this year. But that's the nature of the group too. There were more students this year who are weaker students and have a hard time doing a lot of independent reading and that sort of thing. . . .
>
> I just didn't see the enthusiasm for it. [no, no] And I think that's the nature of the group, too. It was as if this was nothing special. "Oh yeah, just another school assignment." Whereas, last year, there was a lot of enthusiasm, well, there was more enthusiasm, there were still a few kids that weren't, but you're always going to get that anyway. But they were excited about that, and this year I didn't really see it. (Lisa, Interview, April 27, 2004)

I left this interview with the impression that Lisa would try the project, sans video, another year. The changes she suggested - swapping the interview for the script and video - were changes she would be able to carry out.

Researcher Evaluation

I concurred with Lisa's evaluation on a number of points. I noticed the lack of enthusiasm compared to the students from the previous year. Yet, when it came time to film the vignettes, students were enthusiastic and did appear to enjoy that process. We just did not see the level of enthusiasm the previous year's students had when it came to other activities such as working in NiceNet or conducting their research.

I was surprised that some of the changes we made to the project in this iteration did not seem to produce a more positive result. For example, changes such as smaller groups for script writing, and working on the research contiguously, rather than once a week, did not appear to have as much of a positive effect as we expected. Having smaller groups during the script writing stage was beneficial in that we did not receive complaints that some students were not pulling their weight in the groups. However, this time we received complaints that students who were in groups where their script was not chosen for production did not have a clear understanding of the events for the video they acted in. As another example, I did not feel that rescheduling the project to run continuously made a big difference to what students remembered about the rebellion. It seemed to me that, in the year before when we only conducted research activities once a week, those students spent time outside of class researching the topics as well and ended up with a more in-depth understanding of what occurred. However, other than comparing the videos produced in the two years, we have no way of comparing actual student learning. The other confounding factor concerns the class structure between the two years. In Year 1, the weak students from Grade 8 were in a special split class taught by another teacher; they did not participate in the project. In Year 2, all the grade 8 students participated. The split class from Year 2 was composed of those students most able to work on their own, while the large grade 8 class had, for the most part, the weaker and average students. There was a noticeable difference in ability between the split class Grade 8 students and the full class.

The website that replaced the set of links from Year 1 and added more information about people and events was well received. When I talked to students about it, they mentioned its usefulness in their research activities as well as the fact that everything was in one place and easy to access.

It seemed to me that the project had become less constructivist in the second year. One reason for this was the lack of access to computers. Because the project was carried out in a block, we had less time allotted to research activities in the lab. As well, because there was only one computer available for editing, this meant students worked under my supervision, rather than working independently. The tradeoff came because, doing it this way, more students were able to be involved in the editing than when only two students per group were the editors. The ideal situation had occurred in Marie's class – with a class set of laptops, every student learned how to edit using the tutorial, and they took responsibility for their video without our supervision.

Another reason the project seemed more constrained was the fact that the textbook and the PowerPoint presentation were assigned as readings at the beginning of the project. I would have preferred to have the PowerPoint available on the website as a summary, and allow the students to examine it as they did their research, without making it something they were required to read. However, Lisa suggested that we use it as an introduction - she figured they would forget most of it anyway.

However, the majority of the students I interviewed did say that they enjoyed the project, especially making the movie, and many said that they welcomed the opportunity to learn about the time in more depth. As one student told me when I asked her why the project was fun: “Because it was interesting. [In what way?] It was fun to learn about Canadian history. And it was fun making the movie” (Jenna, 2004).

Summary

In this chapter, I examined the second iteration of the North West Rebellion project in Lisa’s Grade 8 classroom. Through excerpts of logs, reflections, and interviews, I explained how the project had evolved in the second year. Following that, I discussed data from the student questionnaire and from their interviews. Finally, I discussed Lisa’s and my evaluation of the project. I presented Lisa’s perspective on what changes she would implement in the project for another iteration. In chapter 8, as part of the final discussion, I will explain what I would do differently if I were to do it again.

In the following chapter, I will examine the learning experiences of the students as well as looking at the barriers and facilitators that emerged.

CHAPTER 7: FINDINGS

The preceding chapters have shown the process of developmental research, discussing the design, implementation and formative evaluation of the project. In this chapter, I will discuss the following two research questions:

What can be said about the learning experiences of the students as they work in the prototype learning environment?

What are the barriers/facilitators in the study classroom that impinge on student-centered learning?

I will also discuss the attainment of the ICT goals specified in chapter 5. Finally, I will introduce a number of challenging elements that I have identified in the project.

Students' Experiences

When I interviewed the students, I was interested in three main topics. First, I asked them to talk about the project and tell me what they thought of it. I asked questions about which activities were most useful and about their experiences with the various components of the project. Second, I asked them what kinds of things they thought we could add or change to improve the project. Finally, I asked them about what activities helped them to learn best. While many of the responses to these first two topics have already been discussed in chapters 5 and 6, most of the responses below arise from our discussions about how the project helped them to learn. Students were interviewed only once and their names are pseudonyms.

The following discussion about students' experiences is organized around four of the nine elements I identified previously as important in a constructivist learning environment and the ways in which those elements were implemented in the study. To answer this question, I will examine students' experiences within the project by analyzing data from student and teacher interviews, as well as introducing my own logs and reflections on the project.

The four elements I will be discussing include: learning involves the active construction and reorganization of knowledge, learning is mediated by artifacts, tools and signs, learning is a collaborative, social-dialogical activity and learning involves multiple perspectives.

Element: Learning involves the active construction and reorganization of knowledge

The learning environment was designed to support and challenge the students' thinking and to give them experience in knowledge construction through choosing their own topic, carrying out independent research, choosing which information to use, writing a script, acting and filming the script, and editing clips to produce a short movie. The students' reported experience of this aspect of the project raised a number of themes including accountability, depth of understanding, the degree of structure provided by the assignment, the amount of action or complexity involved, the value of research, and the importance of a consequential task.

Accountability

Students from both iterations reported that they found the task of writing the script forced them to pay greater attention to the material they were reading during their research in order to get ideas and details they could use in their movie. Kayla said, "writing the script was helpful because you need to do research for it. So then I had to read through all the papers and stuff and then I wrote it. That helped a lot" (Kayla, Interview, 2004). Abby told me, "with the movie I did, it made us learn because we had to know ideas to make the scripts" (Abby, Interview, 2003). Zoe said it was a helpful task, "because then I actually had to write something about it; I had to read it and *pay attention*" (Zoe, Interview, 2004).

A number of students felt that writing the script made them more accountable for the material they were reading. They felt they needed to know what they were talking about. As Tom explained, "You had to learn about the rebellion so you could write it in to the script. You couldn't just make something up, because then it wouldn't have been about the rebellion" (Tom, Interview, 2004) and because that would show "you don't know anything" (Nick, Interview, 2003). The fact that they would have to present their scripts:

> made us make sure we knew what we were doing, because if you're writing a script about the Métis, stopped us saying like they had laser guns. That kind of

> shows you don't know anything but, yeah, you had to make sure you knew what you were doing, what people looked like and how they acted, the events that took place. (Nick, Interview, 2003)

Depth of understanding

The nature of the productive tasks, writing the script and acting and filming the movie, appeared to be successful at challenging students' thinking and stimulating reorganization of knowledge.

Marcy described the experience this way: "In the classroom you just kind of copy things from the book and sometimes you don't even think about what you're actually writing. And you have to actually think about what was happening in that situation that we did on tape" (Sara & Marcy, Interview, 2003).

Some students reported that the task motivated them to go beyond the statistical historical facts and to look for richer details such as "what people looked like and how they acted" (Nick, Interview, 2003). It required them to process the information they were learning and to transform it. "First you have to learn what happened and then you have to put it, like, where to put in, like, actions of what people did, put the consequences of their actions, stuff like that" (Josh, Interview, 2004).

Degree of structure/ownership of the process

Students chose which groups they wanted to research, how they would research the topic, and carried out their research independently. With their group, they decided which event to depict in the movie and which information to use. In these ways, the environment was designed to provide students with opportunities to gain experience with knowledge construction. Students' experience of these processes and responsibilities varied from frustration to appreciation.

Several students expressed difficulty with the lack of structure and direction. Rachel described the project as "unorganized" and said it would have been better to "have daily goals of where we should be by the end of the period so that we'd kind of know where we were working to" (Rachel, Interview, 2004). Marcy commented on the difficulty of trying to make group decisions: "When you're trying to think of what event to do, everybody wants to do something different and then you're all talking about it and then it's just hard to get to where you want to go when everybody's just trying to talk and stuff" (Sara & Marcy, Interview, 2003).

Lisa and I observed groups and individual students struggling with finding their way through the process. After one class I noted in my log (March 3, 2004) how "this group doesn't seem to do anything without being told exactly what to do." On another day after helping a group to settle on a topic for their movie, I made a note to photocopy some information for them and noted how "they didn't seem to have much of an idea about how to go about it" (Bonnie, Log, March 2, 2004).

On the other hand, Kathy (2004) reported a positive response to what she felt was their "independence" towards their learning.

> Kathy: it's giving us like, our own way to use the information. I think it was a good idea cause it gave us more like independence towards our learning.
>
> Bonnie: okay, can you talk about that a little bit more. Explain to me what you mean about independence towards your learning.
>
> Kathy: We got to figure out how to do the script and how to do the different things for it and then, we, like, used the Internet and stuff. And normally, we, like, use the textbook and the information given to us. But in this we got to find our own information. And then we got to, like, work on it with other people. (Kathy, Interview, 2004)

Amount and complexity of action

One student found the level of complexity involved in the video-making activity to be a challenge. She said it was harder to learn about the rebellion because "you had to concentrate more on script and who is playing what part and costumes, and design of background . . . hair and makeup and where everyone was going to stand" (Zoe, Interview, 2004). This level of involvement seemed to distract her from the historical content.

On the other hand, several students reported that being actively involved with the material helped them to learn more. "When you're filming, there's action so it's like, kind of fun, so you understand it more" (Zoe, Interview, 2004). Ethan told me:

> Ethan: we got an interactive experience with it.
>
> Bonnie: Interactive – explain that a little bit more to me.

> Ethan: Interactive so we could, um, such as the PowerPoint and the video which helped us understand it more because we actually got to be in with – playing the rebellion.
>
> Bonnie: Oh, okay, so you're saying that acting it out – is that what you're thinking of in the word interactive?
>
> Ethan: Yes, and PowerPoint, because we got to, as I said before, understand it better because it was, um, I mean, reading the text, sometimes you don't understand it as much but the interactive, you're able to understand it more.
>
> Bonnie: Okay. Why does it make you understand it more?
>
> Ethan: You have a hands-on basis with it. And you're able to understand, okay, so this is what they were going through and these are the events which occurred at the time. (Ethan, Interview, 2004)

This is rather puzzling, since the PowerPoint Timeline was just another textual representation of events. It almost seems as if the fact that you control movement through the timeline makes it interactive and more meaningful.

Another student felt that it was helpful "because you have to play a role as someone else and you get to see what they went through" (Jenna, Interview, 2004). This supports the idea of reorganization of knowledge as well.

Value of research

The process also helped Sara and Marcy recognize the value of research. When discussing the task in the final interview they reported their initial reaction to hearing about the assignment. Sara said, "Oh, we're going to do a movie, I'm, like, ooh, okay, come on, let's go" (Sara & Marcy, Interview, 2003). Her friend Marcy added, "But then you're, like, okay, well, we gotta do this, and we gotta do this, and it's like (she sighs)" (Sara & Marcy, Interview, 2003). When challenged about the ability to write the script without the "this and this" they reluctantly admitted that the research had been necessary, "You can't do anything without research," Sara said, "It's kind of impossible, unless you're some genius" (Sara & Marcy, Interview, 2003).

Nick also recognized its value, saying "I learned a lot more than what we read in a book, because the book had half a chapter on it but it doesn't explain, it didn't get to what we did" (Nick, Interview, 2003).

The consequential task

When I asked students how they learned best, I received a number of answers that I expected, and one that was quite unexpected. A number of students told me they learned best with text readings, others told me they like group work, still others said they learned best by watching the videos of Canada, a People's History. However, the largest group of students talked about how a consequential task would help them learn the best. For Haley (2004) it was writing reports. Others liked making movies or doing presentations. Natalie told me, "I find that I learn better when I have long projects and you have to make a movie out of it or do a presentation about it. Where just bookwork, it seems like you do one thing and it's gone, out of your memory" (Natalie, Interview, 2003). Sam also liked to present his knowledge: "the way I like doing it, is reading through the textbook or something, and then being able to write some kind of report or Microsoft PowerPoint or whatever that is" (Sam, Interview, 2004). For Tony, the consequential task also needs to be fun. He says, "things I like about learning is something where you can learn and yet it's fun, like the movie. The acting out and the creating of it was fun. And yet you did learn quite a bit" (Tony, Interview, 2004). Jenna (2004) told me she likes projects because you can "draw pictures and look up stuff and then you can read it all and summarize it." When I asked her why this helps her learn better she said, "Because you have to think about what you're going to say to summarize it" (Jenna, Interview, 2004). To me, this emphasis on a consequential task shows that students recognize the importance of working with information to actively construct and reorganize knowledge as a way to cement their learning.

Element: Learning is mediated by artifacts, tools & signs

The students' learning was mediated by a number of artifacts, tools and signs. Students used a number of cognitive tools including web links to history sites to scaffold research; tutorials for video production, storyboarding, video techniques, and iMovie editing; and, a PowerPoint timeline to present the events of the Rebellion. A conversation tool, provided via the NiceNet messaging system, was also used primarily in the first year to enable students to communicate outside their classes. Expert performances such as the

CBC Heritage minutes were viewed and analyzed for key features, and both Lisa and myself provided coaching help with technical concepts, research strategies and resources as well as setting topics for scripts.

Using Computers as cognitive tools

Use of the Internet as a source of information as well as a communication tool was a central part of this project. Both positive and negative experiences were reported. On the negative side, the slow Internet connection caused major delays in the classroom. After a day in the lab I noted in my log that the "frustration level of the group was pretty high at times" (January 16, 2003). Another day I wrote: "It took one student about 10 minutes to finally manage to get logged on" (January 21, 2003). Yet another log entry: "Kids were reading email messages while waiting for documents to appear" (March 2, 2004). One day after attempting to log on to NiceNet unsuccessfully, I wrote: "Class was wild with a lot of delay due to trying to get in to demonstrate" (January 16, 2003).

Students in the second year did not appear to have developed any kind of work ethic within the computer lab. They forgot their login passwords, perhaps because they had not used the computers very much. From my log, "One student has only logged on once this year – when they did their project before Christmas. She was in a group and didn't have to log in. This means that they have not used the computers in any classes this year other than social studies and only now" (Bonnie, Log, February 23, 2004). In fact, the teacher was reluctant to allow this year's group into the lab because they tended to fool around and waste time. It appears that students regarded lab time as time to play. I noted in my log: "As soon as these students are asked to do anything where they might have a smidgeon of flexibility they go wild. They visit with friends or read email and send messages to each other" (Bonnie, Log, March 9, 2004).

On a more positive note, Year 1 students did report that the organization of NiceNet provided support for their learning.. They told me: "NiceNet was good because you had downloaded all the sites there so that they were all there for you and you didn't have to go look up sites (Natalie, Interview, 2003). This idea was also echoed by Alex, who said "The links were useful because they gave a lot of information, and you could find out stuff" (Alex, Interview, 2003). In Year 2, students mentioned that the website was a useful support because "it showed you what happened, like the map, for example, showed you where the battles occurred. And it had a biography of the people which you could understand, who they were, what their points of views were, and it helped you understand the events which occurred" (Ethan, Interview, 2004). Students mentioned its accessibility, saying "I used those in my script, the perspectives for the Duck Lake battle. . . . I found it useful because it's right there where I could get it, just like the PowerPoint" (Sam, Interview, 2004), and "it's fast going so it's easy to look at" (Zach, Interview, 2004), and it was "nicely categorized. And the map was neat, you could just click on the people or events that happened" (Rachel, Interview, 2004). Access to the rebellion database was much quicker in Year 2 because it was stored on the school server.

Coaching at critical times

Another type of mediation occurs when more knowledgeable others scaffold students when needed. One example of a critical time when the researcher coached students on the use of artifacts and tools was with one group of students who were struggling with writing their script.

> Bonnie: I kept bringing them more stuff and saying, "Well here, you know, this is what happened, and this is what these guys said happened" and bringing them in diaries and things like that. And it was funny, the first couple of days they were trying to write it without reading anything and I kept saying, "but you know, it says here" (I laugh) And finally, I think it was about the third day, one of them says, "Well, I think I'm going to take this home and read it". (Lisa, Interview, April 27, 2004)

This anecdote suggests that these students were unfamiliar with the kinds of activities they needed to carry out in order to be responsible for their own learning. They had had little in the way of "acculturation" to this style of learning and so were a little slow to realize what they would need to do in order to accomplish the task. This was likely due to the traditional nature of this classroom. As Lisa explained:

> I use the textbook. You know, I rely on that, the students do mostly written work, they don't do a lot of work where they have to do research on their own. There's some, there's some projects like that throughout the year but, um, yeah, it's pretty traditional. So this is different. [Okay] You know, I do some things, I've done PowerPoint presentations, had the kids do research for that sort of thing, you know, I do some art related work, posters, that kind of thing too. [Yeah] Yeah, I've done some interviews in the past, not necessarily with this grade but with other students. I've done some workstation things, done some simulation things

> but, you know, those seem to be special things that come up on an irregular basis [uh huh] and then in between those, we're just doing the old fashioned kind of learning. (Lisa, Interview, April 27, 2004)

This is contrasted with Marie's class where students were expected work independently for a great deal of the time. As I described her classroom to Lisa:

> they had had a whole year of doing those kinds of activities. Like that was the way their classroom worked. They did research all the time. They didn't do – I don't think she had a textbook . . . . Or if she did, it was used very little. (Lisa, Interview, April 27, 2004)

While critical timing of teacher coaching is an important element in a constructivist environment, it may be that the student skills required in research and independent learning need to be built up over time as was done in Marie's classroom. Parachuting in a different model in the midst of a traditional teacher and textbook-centered culture for a single project may require too great a shift for students and teacher alike.

Element: Learning is a collaborative, social-dialogical activity

A constructivist environment aims to support collaboration in the construction of knowledge through social negotiation. This project required students to contribute to and negotiate meaning within groups – all members of which were expected to participate. Following is a general discussion of the students' experiences in their groups followed by a discussion about the division of labor and the decision making process. It finishes with a discussion of the perceived benefits and drawbacks of working in groups.

Experience with group work

A number of students felt that working in groups was a positive experience. Jake said, “Anything we really did in a group was fun” (Jake, Interview, 2003). Vicky felt that “sometimes it's good to do things alone, but something like this is fun to do in a group because you can share and stuff” (Vicky, Interview, 2003). Emma (2003) thought that the groups were chosen well. Natalie reported, “My group was great. We worked really well together” (Natalie, Interview, 2003). Abby said, “I didn't have any enemies in that group, thank God. So it was fun ‘cause I got along with everybody” (Abby, Interview, 2003).

Other students noted some frustrations and difficulties they experienced in their groups, primarily concerning use of time and conflict resolution. A number of students referred to the amount of fooling around that occurred in their group. Abby felt that "a lot of people wasted time" (Abby, Interview, 2003). Marcy admitted "We ended up figuring out what we did, but it was kind of hard because you're, well, fooling around" (Sara & Marcy, Interview, 2003). Bill described the time spent in the lab posting to NiceNet:

> A lot of people just talked to the people beside them and they weren't done what they had to do. . .'cause I know M. was talking to C. and other people were talking to other people and it wasn't a very cooperative environment. We didn't get much done. (Bill, Interview, 2003)

According to Marcy, this is unavoidable, "The kids are, I guess, fooling around. Like, it's junior high, everybody's gonna do that" (Sara & Marcy, Interview, 2003).

A number of groups also experienced difficulties with resolving conflicts. For example, Sara reported: "L and B, all they did was fight. And, I don't know, it was just frustrating for other people when other people are a pain 'cause it's harder to get our work done" (Sara & Marcy, Interview, 2003). Sara also said that "we got all the script and everything no problem, but just the group work together, we fought, a lot. And it was kind of frustrating" (Sara & Marcy, Interview, 2003). Ethan (2004) told me: "Some people, you're able to communicate with and work with well. Other people you can't work with well. Because either they don't listen to you or they have different points of view and they won't make a compromise" (Ethan, Interview, 2004).

A specific example of conflict was depicted in the following student's description of the writing of the script:

> Bonnie: You worked in a group to develop the idea of the script, right?
>
> Zoe: To develop the idea, yeah. But they just sat and talked about Internet stuff and email addresses. So, it was kinda harder for me because I was, like, "You guys have to help me" and they wouldn't help me, and they'll be, like, "Oh, you can do it" and I'll be, like, "Fine. I'll write the script tonight" and they'll be, like, "Okay, fine." I took it to them the next day and they said, "Aw, that's pretty good, but why did you do it without us?" "You told me to." And it got really annoying cause it was like "I did it because you told me to do it." And they're like "No, we didn't. We wanted to help". (Zoe, Interview, 2004)

Division of labor

For some groups the division of labor seemed to fall into place easily. "Everybody had an opinion and perspective so it was easier…if one person thought it was difficult another person thought it was easy, so it was easier to make things work to create jobs and divide them out evenly" (Emma, Interview, 2003). Another student reported:

> We just kind of pick what we're going to do and usually every time we picked, everyone wanted to do something different. It just worked out for us. We never had to decide who was going to do what because we all knew what we wanted to do. (Natalie, Interview, 2003)

For other groups however, the division of labor was one of the sources of conflict. In both years, students reported problems with some students doing more work than others. "There were a couple of people that weren't working as hard to just gather everything up" (Zach, Interview, 2004). "Some people didn't really help that much" (Molly, Interview, 2003). " Some people [worked] more than others. I think A. did the most work" (Julie, Interview, 2004). "Only a couple of people did it" (Zach, Interview, 2004). " J. just didn't do very much except for complain and make jokes, and then C. didn't do much and J. didn't do much and J. and L. helped" (Molly, Interview, 2003). One student thought that those who were not working as hard "didn't care. They thought that it doesn't matter, the rest of the members would do their job" (Bill, Interview, 2003). Observations of the groups by Lisa and myself corroborated the fact that some groups experienced difficulty in this area. Lisa pointed out that in the first year, with groups of six, "there always ended up to be somebody who didn't work very hard. And the kids got really irate about that" (Lisa, Interview, February 2, 2004).

In some cases there seemed to be a split between the boys and the girls. When asked if he had worked on the script, one boy explained, "The girls wanted to work on it. Also, they never even told us, they just said 'we're doing the script and you guys can't help or whatever'. They just took it home and did it" (Jake, Interview, 2003). Molly described the process: "We tried to do the backdrops and costumes and everything and the boys were supposed to make up their own costumes and do that thing - like the script and the storyline, but they didn't do that, so we had to" (Molly, Interview, 2003).

Decision-making

Some students reported that the decision-making process in their group went smoothly. A number of groups reported using a majority rule system, making final decisions through a vote. "We had agreement in a democracy where we had everybody's points of view and then we made a decision" (Ethan, Interview, 2004). For some groups, there was a process that led to voting as a means for solving conflicts. "We did have some conflict at some time" said Tony, "until we got the system where we would say 'Well, who likes it?' and if a lot of people didn't like it, we just wouldn't use it" (Tony, Interview, 2004). He also said that some people were tending to "overpower" but that "was all solved in the end because they didn't have all the power with voting. Everyone had equal power. There's ten of us. We each had 10 %" (Tony, Interview, 2004).

For others, the group's decision-making processes were less structured. "We all threw in ideas and then we see which person liked – who thought which one was the best and then we kind of, like, roll with it. And that's how it pretty much fell into place. Just rolled with it" (Josh, Interview, 2004). Another student described the process this way: "We all gave our opinions and then we kind of put it all together and tried to make – we came up with one idea and tried to come up with ways that we could make it good" (Julie, Interview, 2004).

Other groups experienced more difficulty in reaching decisions. For example, Marcy described the groups' choosing of the event this way:

> Marcy: Well, we know what we have to do; it's just hard to get there when everybody's trying to put their ideas in and stuff. Like, when you're trying to think of what event to do, everybody wants to do something different and then you're all taking about it and then, it's just hard to get to where you want to go when everybody's just trying to talk and stuff.
>
> Bonnie: So, how did you decide what event to do?
>
> Marcy: Well eventually you and the teacher came over and then you were, like, "Yeah, this would be a good event" and then we were all just, like, "Yeah that sounds better than all of us fighting over it". (Sara & Marcy, Interview, 2003)

Indeed, Lisa and I observed some of the groups' difficulties with making a choice. Concerning the full class in Year 2, I noted: "Lots of groups without much of an idea about what they want to act out. I'm not surprised. This group doesn't seem to do anything without being told exactly what to do" (Bonnie, Log, March 3, 2004).

Perceived Benefits and Drawbacks of Working in Groups

Some of the benefits of working in groups that the students identified included the fact you get to know more people (if your group does not consists of your friends), it was easier and more efficient, and it capitalized on individual strengths. The drawbacks included the fact that some people did not work well in groups, and also that the makeup of the group could make or break it.

Benefits.

A number of students felt that the group work contributed to their learning experience in a number of ways. "We were working as a group and I work better like that," said Jake (Interview, 2003). Kathy found the task easier when it was shared because "there was lots of people to put in their input" (Kathy, Interview, 2004). As Josh pointed out, different people bring different strengths: "Everyone had different strengths, like A., she's really smart, J. creative, B., also creative . . . . Oh, no, B., he knew the textbook" (Josh, Interview, 2004). Another pointed out "it sometimes can go faster when you have more than one mind working at once" (Troy, Interview, 2004). Sara commented " it also is good to go with other people so you get to know people more" (Sara & Marcy, Interview, 2004). As well, another felt that "you get more information, like one person can look through one book at a time, where three people can look at their books" (Bill, Interview, 2003).

A number of students felt that the differing viewpoints they got from working in a group made a valuable contribution to the learning process. They felt it made the task easier: "Instead of just having one person's opinion, you have more people's opinions, so it would be a lot easier" (Bill, Interview, 2003). Finally, one student felt more secure in a group because "you get, like, other people's opinions instead of just yours and you don't have to worry about if your answer is right or wrong, but everyone says theirs and then you try and find the best answer" (Julie, Interview, 2004).

Drawbacks.

One of the difficulties with working in groups identified by students was the ability of individual group members to work with a group. "It just depends who their group consists of" (Molly, Interview, 2003). As one student explained: "Some people, you're able to communicate with and work with well. Other people you can't work with well, because either they don't listen to you or they have different points of view and they won't compromise" (Ethan, Interview, 2004). Molly expressed a similar idea:

> "If you do like you're supposed to as [an] individual, it helps. But if you don't work with the group and you don't compromise then it's not good either. So, for the people who don't work well in a group, it's not that good for them because it takes lots of teamwork to do it …some people work; some people don't. (Molly, Interview, 2003)

Therefore, group composition can be a big factor in how well the experience goes.

Element: Learning involves multiple perspectives

Students were exposed to multiple points of view as they saw the perspective of the other groups involved in the rebellion (Whites, Metis, First Nations, Government, Military/Police) when viewing other groups' presentations. Different representations of the information provided differing perspectives from these groups as well. Multiple passes through the information were provided through multiple media including the Canada a People's History video clips, the PowerPoint timeline, many original source documents and the website.

Ascertaining Differing Perspectives from Other Groups

In the first year, students were able to appreciate the perspectives of the different groups involved in the Rebellion from the student presentations. Marcy described the experience of discovering that another group had a different perspective, "at the end they were like giving their perspective and then you were like 'oh yeah, that's what they thought,' but then, well, we thought a totally different thing" (Sara & Marcy, Interview, 2003).

Molly felt that focusing on just one perspective helped to avoid the confusion of sorting out all the different perspectives in the research process. As well, having a more solid understanding of one group's perspective provided a point of reference for understanding the others'. " I learned more about just our area …than other people's," but went on to say, " you have a bit of an idea but you don't have a thorough idea about the other groups' perspective, more just your own" (Molly, Interview, 2003).

Multiple Representations through Different Media Sources

Students experienced multiple passes through the material using a variety of methods including watching the video, Canada, a People's History (CaPH), readings from the textbook, resources on the website, copies of original source material, as well as a PowerPoint presentation of the timeline. They also had to work with the information as they wrote and acted out their scripts. Not surprisingly, different students experienced and valued these sources differently.

Students thought having the opportunity to read the actual descriptions from people who lived during the time was valuable. As one student told me, "it kind of describes it more. Just from the person's view so you kind of get a more accurate summary because people were there and they . . . didn't research how to do it, they just lived through it" (Nick, Interview, 2003). Sara and Marcy also mentioned the idea that they could glean more information from the primary sources because they provided the full story rather than the abbreviated version available from a textbook. Here is our conversation:

> Bonnie: I had a question about using primary sources, some of the things that were in the box were actual stories of what people had gone through, that kind of thing. Um, is it better to use those, like, do those help you learn more than just, than if you had just read the chapter in the textbook.
>
> Both: oh definitely.
>
> Bonnie: And why?
>
> Sara: Well, I don't know, it's like it's different. I don't know, it's kind of hard to explain 'cause like students, ... I think that they find it more interesting when there's, like, different stuff there instead of just like create projects, answer questions, you know. People find it more interesting so they learn from it better.
>
> Marcy: And then, in the book, it's like, they just have, like, this little box on, like, one person and it doesn't really give their perspective or anything. So all the different stories might, like, give everybody's opinion.
>
> Sara: Yeah, and it's better – it's better to have, like, a page about, like, that person and what they went through than to have a little box on the page. Like, you find out more. (Sara & Marcy, Interview, 2003)

Students appreciated the opportunity to have a 'hands-on' activity. As Natalie said, "If I just read it, its like, 'oh yeah'. But if you can read it and do a project on it, I find I learn the information better" (Natalie, Interview, 2003). Ethan echoed similar sentiments when discussing making the video: "You have a hands-on basis with it. And you're able to understand, okay, so this is what they were going through and these are the events which occurred at the time" (Ethan, Interview, 2004). Several students found the making of the movie enjoyable as well as helpful. According to Tony, "The acting out and the creating of it was fun. And yet, you did learn quite a bit" (Tony, Interview, 2004).

A number of students found the text-based materials more useful than Internet resources. As Vicky (Interview, 2003) said, "when it's actually written down, then I somehow remember that easier." Others preferred the readings from the textbook because "they weren't as long as the movies, and well, they just summarized all the events" (Marie, Interview, 2004). Another student, Sara, of the opposite opinion, said she would "rather read, like, a story than the summary of it" (Sara & Marcy, Interview, 2003). In fact, several students mentioned how they found the textbook material easier than the web-based resources. Kathy (Interview, 2004) said it was more straightforward because "when you have to, like, decipher stuff, like, from the Internet, you have to figure out if that stuff is what you need or not. And from the textbook, it's, like, that's really what you need". Another said "So books I find, that it takes less time. You open the book to that page and you read about it, where Internet it could take up to an hour" (Bill, Interview, 2003).

One student, Ethan, was even able to articulate the fact that the different sources provided afforded unique ways of conveying information:

> Bonnie: Did you use the web site at all. [yes] Were there things in there that were helpful? [yes] Or do you think it was just the same as everything else? Do you know what I mean? Was it a different kind of useful and if it was, how was it?
>
> Ethan: Different kind of useful because it showed you what happened, like the map, for example, showed you where the battles occurred. And it had a biography of the people which you could understand, who they were, what their points of views were, and it helped you understand the events which occurred.
>
> B: Right. And you had an interview person. Who did you have to find out about?
>
> Ethan: Uh, Gabriel Dumont.

> B: And did you read it? [Yeah] And was it helpful in finding out about Gabriel? [yeah] In what way?
>
> Ethan: It had a biography on him and had his personal account on what happened during the rebellion.
>
> B: And what's it like to read a personal account? Is that different than the textbook, and in what way?
>
> Ethan: It's different from the textbook because you get to see what happened from the point of view of that person where the textbook, it just says, okay, here's what happened. And it doesn't show the points of view.
>
> B: And what do you think about that? Finding out about the points of view.
>
> Ethan: Um, I thought it was very cool.
>
> B: Uh huh. In what way?
>
> Ethan: Well, you could see, okay, here's what this person's beliefs and the other side's beliefs and you got to understand why they were fighting. (Ethan, Interview, 2004)

Many students reported that the CaPH videos were helpful. When I asked Tom what part of the project helped him learn the most, he explained, "I like visual stuff more than writing things or anything. I like watching movies. If I want to learn something I'd rather watch it in a movie than read about it (Tom, Interview, 2004). Rachel felt that "the dramatization made it easier to understand" (Rachel, Interview, 2004). Another reported: "I actually got to see, like, what it was. Then after I knew about the video clips, then I could write out the script and then I could understand it better" (Kayla, Interview, 2004).

In the previous section, I have attempted to capture some of the thoughts and feelings of the students involved in the North West Rebellion project. The first section discussed how students worked actively to construct an understanding of the rebellion, recounting themes of accountability, depth of understanding, structure and ownership, complexity of action involved, the value of research for a project such as this, and the importance of the consequential task. The second section discussed how students' learning was mediated by a number of cognitive tools such as computers, and how students were scaffolded during the process. The third section discussed student insights concerning group interactions and the last section examined how multiple representations of knowledge in the form of videos, text-based resources and web resources helped the students to examine the multiple perspectives present in conflict such as the rebellion.

During Year 2, I asked students what they recalled about the rebellion. I would now like to examine their responses concerning that topic.

What Students Recalled about the Rebellion

During the first year, I only asked students for comments about the project and suggestions for improvement. During the second year interviews, I also asked the students what they had learned about the rebellion. Asking these students what they recalled was a very humbling experience. After all, we had watched 3-4 days of video about the rebellion, read about it in the text, examined a timeline of events, read about people who were involved, written a script, and acted out an event. Sometimes when I asked the question, I got this response:

> Bonnie: If I asked you, well, what were the causes of the rebellion, could you tell me because we learned it?
>
> Julie: No.
>
> Bonnie: No?
>
> Julie: I can't remember that stuff because… I don't know. (Julie, 2004).

Other students would initially tell me they did not remember, but when probed further, came up with pretty cogent summaries. For example, here is Tom's explanation:

> Bonnie: So what do you think you learned about the rebellion. Tell me what you learned.
>
> Tom: uh (*pause*) I learned that – can't remember.
>
> B: can you tell me why the Metis would want to have a rebellion?
>
> Tom: probably because they wanted their own voice and they were afraid that their culture and everything was not going to exist for much longer because the white people kept coming in and taking all their things and they wanted that to stop. (Tom, Interview, 2004)

Many students told me they knew a lot about the events depicted in their scripts, but were much less confident of their overall knowledge of the rebellion. For example, Tony told me, "What comes into my mind the most was the video that we made and Fish Creek" (Tony, Interview, 2004). Molly told me, "I learned more about just our area of the settlers more than other people's" (Molly, Interview, 2003). When I asked Ethan what he remembered, he told me, "bit sketchy here, can't remember much. But I believe they were fighting for their freedom, so they could have their own choice because Macdonald he's sort of enforcing the law and they're fighting because they want their land" (Ethan, Interview, 2004).

Some students were very clear about what they had learned. Here are two students, Kathy and Marie, who have a fairly good grasp of what happened:

> Kathy: I learned quite a bit about Frog Lake, because that's what I did our script on. Yeah, I learned that, like, I don't know, I learned so much. Well I learned that there was quite a bit of conflict between the white people and the native people. And that even some native people didn't like other native people, so there was lots of conflict between them. And I learned about the food shortage for the native people and that native people didn't really know that the white people had, like, such a good life other than they did. And I think there was, like, conflict between the chiefs of different native tribes.
>
> Bonnie: so you learned a lot about the native side of the rebellion? [Yeah] How about the Metis side, did you learn anything about them?
>
> Kathy: Well, my script wasn't on the Metis tribes so [right] I didn't really learn that much about them, but, what I did learn about, like, Louis Riel, I thought that that was really good. Like, um, how Louis Riel had fought for the rights of his people and stuff.
>
> Bonnie: and what were they looking for? Why did they rebel, the Metis?
>
> Kathy: the Metis rebelled because their land was being taken away and they weren't being treated fairly. (Kathy, Interview, 2004)

> Bonnie: So, if I were to ask you – why did the Northwest rebellion start, could you tell me the answer to that? [Yeah] And what would you say was the reason that it started?
>
> Marie: Um, because they wanted – the government wasn't giving them what they wanted so they had to try and, like, fight for their rights and what they wanted. And they tried to, like, have peaceful ways, still, like, petitions and stuff [right] but then the government wasn't listening to them and so they had to take more drastic measures [I see] and then that's how it started. (Marie, Interview, 2004)

Other students had some pretty idiosyncratic views of what happened back then. Here are two different explanations from Josh and Tony concerning what happened in 1885:

> Josh: I learned about Louis Riel and what happened with the natives and how the white people tried to trick them into giving them their lands and stuff. And when

> stuff was found, and when wars began, and laws, and. . . who people were, and what they standed for, like, what they believed in.
>
> Bonnie: Give me an example of that.
>
> Josh: Uh, Louis Riel, he believed that everyone should be treated, like, equal, like, just 'cause he was Indian, like, part. And Poundmaker and Big Bear, they believed that they shouldn't be treated just cause they're a different color or they believe in a different religion. That's all I can think of.
>
> Bonnie: What about events? There was a rebellion, right? [Yeah] why was there a rebellion?
>
> Josh: Gosh, I can't remember, I think this is the rebellion, is it when the whites promised the Indians like a reserve right? [Uh huh] And then they put them on and they didn't want any whites going there to like trade them cheaper and better stuff. I can't remember.
>
> Bonnie: How about the Metis? Why did they want Louis Riel to come back from Montana?
>
> Josh: Oh, to help them in their dispute with the whites. Because he was in the other thing so he had experience in it and a lot of people supported him.
>
> Bonnie: Why did they think they had to rebel?
>
> Josh: Why did they think they had to? [The Metis, yeah] Because they would have been taken over by the white settlers and the white people and they, yeah.
>
> Bonnie: Were they fighting for something in particular?
>
> Josh: Their freedom to keep their culture going and keep their lands because the government really promised them something and then gave it to other people. Um, I can't remember anything else. (Josh, Interview, 2004)

> Tony: The main part we focused on was Fish Creek and the battle there. And what led up to it. And the railroad that Macdonald built and how the government was going haywire because all the people were angry because of that bill that had been passed that was giving the people – the patriots, was it, was giving all their stuff back that had been destroyed, paid for. Any land that was destroyed, taken away. So – government, having to get new government, and responsible government or the cabinet, which would be back then the Executive Council, was chosen by the legislative assembly which is voted by the people. The people had more power in the government, which is good. Which today led to, of course, our government system. (Tony, Interview, 2004)

[Author's note: I am not quite sure what Tony is referring to, but I suspect it has something to do with another part of the history course.]

As you can see from the quotations above, the range of understanding and recall of events varied widely amongst the students interviewed. While conducting the interviews, I was amazed at the range of answers I received when I asked them to recall what they had learned.

Barriers and Facilitators

This section looks at another of my research questions:

What are the barriers/facilitators in the study classroom that impinge on student-centered learning?

To find the answer to this question, I searched my logs and the student and teacher interviews, looking for incidents that demonstrated these factors. Two barriers became obvious during the implementation of the project. These barriers involved time and technology. Facilitators in the classroom included the teacher and students' positive perceptions about the project, and the alternative mode of learning that allowed for individual differences.

Barriers

Time

First and foremost was the issue of time. Over and over again, we experienced a time crunch. My journal is filled with comments such as " everything was much too rushed" (Bonnie, Log, February 26, 2004), "never enough time for anything" (Bonnie, Log, February 25, 2004), "Due to time constraints, not enough time to post" (Bonnie, Log, February 24, 2004), "[students] didn't have enough time to complete entry" (Bonnie, Log, February 20, 2004), and so on. As a result, several times we adjusted the project to reduce the time that would be required. Frequently, learning activities were frustratingly abbreviated or abandoned. The constructivist elements requiring student agency were supplanted by more traditional, teacher-directed methods because they required less time. Lisa commented, "posting on NiceNet. Looking back on that one, I think we probably rushed through that, too, and didn't really give the students enough opportunity to do that justice" (Lisa, Interview, April 27, 2004). Time pressures seemed to come primarily from two different areas: the demands of the departmental curriculum and the structure of the school day.

Covering the Curriculum.

On several occasions, Lisa expressed concern about feeling pressure to cover the curriculum and about the time the project was taking. She commented that she was behind on regular history. She was willing to give the project more time than she would normally have given the topic because, as I noted in my log, "she considered it to be integrating ICT as well as SS so could take more time than the curriculum allowed" (Bonnie, Log, November 12, 2002). However, it still required more time than we had anticipated. In Year 2, she asked that we shorten the project by eliminating the interview assignment. She said "[it was something] I was keeping in the back of my head all the time. Was the time. Oh, too much time, too much time. Because I know what happened last year and it was – there wasn't enough time for me to finish social 8 last year" (Lisa, Interview, April 27, 2004).

I, too, began to question the feasibility of the project in a traditional classroom. In Year 2 I noted "We've been at this for two weeks already and will have spent almost a month just on lead up before we even start to film. In a regular timetable, 1.5 months spent on this project is totally unrealistic. . . . It is almost impossible to do this kind of a project without causing other parts of the curriculum to suffer" (Bonnie, Log, March 2, 2004).

Junior High Class Schedules.

Another source of time pressure came from the organization of the students' school day. The day is divided into 50-minute periods, and as Lisa pointed out, "50 minutes is so short, some kids are just getting started with their reading when the time is up" (Bonnie, Log, January 28, 2003). In addition to the periods, the fact that in junior high students begin to move to different classrooms and different teachers puts additional pressure on projects. As Lisa described it, " something like this would work more effectively in an elementary class where you can take some time from English or Language Arts and Art integrate it. You can use a topic and put it into all these different subject areas and make it work that way. But you know, we gotta live with that bell when we're in Junior High and okay, Social's over, gotta move on" (Lisa, Interview, April 27, 2004). In fact, we did try to bring the LA teacher on board by having the students write the position paper and script in her class and although she agreed to it when we first asked her, when the time came, she told us she was too busy to include it.

Technology

The second area that presented a problem almost immediately was the availability of appropriate technology and support. This meant that we had to work around slow Internet connections, problematic computer software and hardware configurations and limited technical support.

Slow Internet Access.

The school is connected to the Internet with a 56K connection. This resulted in major delays in accessing some of the web resources we wanted to use. I described one experience when I took a group of students to the lab:

> First it took a long time to log in to NiceNet and then it took at least 1-2 minutes for each page to appear. The pages were all images in cartoon form so even though they were b&w they still took a long time to download. Kids were reading email messages while waiting for documents to appear. (Bonnie, Log, March 2, 2004)

Another log entry described a similar experience for the teacher:

> Lisa loaded one of the sites I found – Atlas of Canada then began to discuss abovementioned tasks. She also demonstrated how to start PowerPoint, the templates and how to create slide pages. After she finished discussion, the page for the atlas still hadn't loaded. (This was a wait of at least 5 minutes and the page hadn't loaded). (Bonnie, Log, October 29, 2002)

As a result of this difficulty, we sometimes altered assignments in order to make use of the class time: "Lisa explained she had to change the assignment because students were waiting too long for Internet sites to appear" (Bonnie, Log, November 20, 2002).

I also questioned whether we could depend on the Internet and considered other options:

> Definitely need to do messages in word processor first to alleviate the problem of everyone trying to connect at once. I am wondering if it is realistic to use Internet for other sources as well. A local server solution or CDs with documents in them might be the way to go – paper another option. (Bonnie, Log, January 16, 2003)

The file box of paper-based resources was also available and helped to reduce the pressure when the lab was not cooperating:

> Having paper resources available alleviated some of the problems of students signing on to the Internet at the same time and overloading the system. System still seems flaky and keeps dropping signal for some reason. It took one student about 10 minutes to finally manage to get logged on. (Bonnie, Log, January 21, 2003)

Technology glitches.

We sometimes experienced difficulty logging on to the NiceNet site. Our very first attempt was indicative of the kind of experience encountered:

> NiceNet, was unable at first but later got in to demonstrate. Also had to figure out how to use new projector in lab. Class was wild with a lot of delay due to trying to get in to demonstrate. Since we couldn't get in with the lab projector, we tried to use the classroom projector. Same problem but three of the six computers in the classroom were able to log in. Had students watch as these people registered in the class then logged in. Moved class to the lab and about three quarters eventually were able to log in to NiceNet, including myself this time. I demonstrated the conferencing area and the links area and we had the students who could log in write us messages in their team areas. The majority of the class was taken up with this process. (Bonnie, Log, January 16, 2003)

Another day I entered the following:

> I started out by trying to demonstrate more things about NiceNet. I had logged on with no problem just at the end of class but by the time everyone was looking, could not log in over again. Waited several minutes while discussing some protocol for using the topic areas, then gave up and had students move into groups and start reading from the box. Students were told to make notes on what they were reading to post in the team areas. I helped several students who were not properly logged in from before to get registered in the class. (Bonnie, Log, January 21, 2003)

There were also problems with the configuration of the computers and peripherals in the school, which were not designed to support multimedia:

> We try to print out W. McLean's account of the negotiations between him and Big Bear but E. cannot log on. I go into the library to see if I can log in. The first time I press return and it won't let me in, the second time I click the button and it works. Before I can print, I have to install a printer. This is not an activity that should be happening on a library computer. What gives? Why are those things not automatic? (Bonnie, Log, March 3, 2004)

> A problem, which had taken major emails back and forth, turned out to be pretty trivial to solve. It was a matter of going into IE and telling it to check every time

> for default browser. Not completely smooth sailing, though, I could change the setting on two machines with my level of privileges but not on one. Go figure. The guy had no notion why that was. (Bonnie, Log, February 23, 2004)

Difficulties with Tech support.

The first year, a visiting technician provided technical support. Sometimes of course, the need for support did not coincide with her visit to the school. For example, here is an entry from my log:

> During this time a very typical thing occurred. Lisa had just been given a new computer for her classroom. When she went to use her email, the computer was not set up properly to allow her to use email. She was quite upset that she wouldn't be able to use her email until the tech arrived again (I think that was on Friday). I suggested that maybe she could call the tech and get her to walk her through it sooner. However, the phone is on the opposite side of the room from the computer so she would have to go back and forth from the phone to the computer. (Bonnie, Log, November 12, 2002)

There was a new technical support system in place the second year. This year, technicians were not assigned to specific schools so any requests for assistance needed to be submitted as emails to the help desk. I was not allowed to communicate directly with technical personnel, so, I had to have Lisa request any assistance we needed. This was problematic since I usually understood the problem but the technicians would contact Lisa for further information or show up in the school on days I was not present.

> After class the principal showed up to ask whether things had been resolved. Lisa mentioned the frustration of having to do everything through emails to help desk and principal asked that she tell him whenever it is a problem so he can keep track of it. I gather (infer) that he's not too keen on the new policy either. (Bonnie, Log, February 23, 2004)

As a result of all these technical difficulties, staff resources were diverted from the task of supporting student learning and valuable class time was wasted for the students.

Windows NT does not do Multimedia!

It never occurred to me that I would work in a setting where I could not perform basic multimedia tasks such as digitizing or editing video and audio. Incorporating those elements into the curriculum are listed as objectives by the ICT curriculum. I had worked with Windows computers before and I had always found software to do these tasks. Other schools I had worked with had these resources available. What I didn't realize when I went to Lisa's classroom was that Windows NT is a network solution for large business use and did not include any provision for multimedia activities. There was a basic productivity suite available and it was possible to integrate pictures in the word processor, but there was no provision for activities such as web design or multimedia design. For example:

> Lisa and I looked at the rebellion CD, then tried to install the Making History CD – no dice- I suggested maybe we needed an administrator password to do it. [*It turned out the program did not work with Windows NT*] We looked at the Muvee program but weren't able to try it because we didn't have any mpg or AVI videos to test it and the video camera was still missing. (Bonnie, Log, February 4, 2003)
>
> After the period was over, I searched 3 of the computers to see if I could locate Windows Movie Maker but was unable to find it. Lisa said she would contact the computer tech, and see about getting it put on all 6 computers. [*This program did not work with Windows NT either*] (Bonnie, Log, December 11, 2002)

Indeed, in the large lab, it was often hard even to view online video. I was able to add some programs to Lisa's classroom computers but, for the most part, we were very restricted in what we could do. If I had known in the beginning how many restrictions Windows NT would place on the project, I would have thought very seriously about changing the project in ways that would rely less on the need for multimedia while still incorporating aspects of ICT such as internet searching and communications technology.

Facilitators

While sometimes it seemed to me that the barriers in this project were overwhelming, there were some definite facilitators acting as a positive force during the project as well. These facilitators included the students' positive response to working on the project, particularly their perception of fun, the positive attitude of the teacher, and the fact that students were allowed try a very different mode of learning than their typical day-to-day activities.

Students' Positive Attitude

A number of times throughout the course, in my logs, or in conversations with the teacher, we both mentioned our perceptions about students' enthusiasm for the project. Lisa said to me during an interview:

> I think that I saw a lot of enthusiasm among them today when they got together in their groups at the end of class and started to talk about what kind of a thing they would do for their film. How they would go about getting ideas. (Lisa, Interview, February 4, 2003)

Another time she reported: "N.'s daughter is in grade 8. And every week she asks me, 'When's Mrs. Skaalid coming to our class?' Every week" (Bonnie, Log, January 16, 2003). This enthusiastic attitude was echoed by a student in the second year who said "It was a good project and I hope that everyone else gets a chance to do it" (Zach, Interview, 2004).

Perception of Fun.

Molly said to me: "it was a really good project, I liked it, it was lots of fun" (Molly, 2003). Marcy agreed, "cause it was so cool to be an actor, to be, like, fetch me my trailer" (Sara & Marcy, Interview, 2003). Another student recounted:

> The movie was fun. It was that the weather played a great role, directing was good, and I think the movie helped a lot. I think everyone enjoyed the movie, and since they enjoyed it, they kept focused on the movie and learned quite a bit. (Bill, Interview, 2003)

Other comments from students included: "It was fun to learn about Canadian history. And it was fun making the movie" (Jenna, Interview, 2004), and "Things I like about learning is something where you can learn and yet it's fun, like the movie. The acting out and the creating of it was fun" (Tony, Interview, 2004).

I found it very intriguing how the students equated fun with learning. Although the literature talks about engagement fostering learning, I do not think I have ever encountered any mention of this particular facet. For example: "But in a movie when there's action, or when you're filming, there's action so it's, like, kind of fun, so you understand it more" (Zoe, Interview, 2004).

Lisa's Positive Attitude

Lisa was an enthusiastic co-designer right from the beginning. During one interview, when I asked her about working with me, she said:

> Lisa: I can already tell you how I feel about it. I think it's great. I mean, you were offering me an opportunity which I would never have on my own. I do not have enough skills in the field that you're helping out here to even begin to do this. [Uh huh] I would have to take a course in how to make movies and so I think that it's great. I've always welcomed other people in the classroom, anybody can come in here anytime, I don't mind. And to have someone else come in and help out on a project like this and you've got this great idea – I mean, I don't even know who could say no to that. Really.
>
> Bonnie: Believe me, lots of people can. (I laugh)
>
> Lisa: Well I guess. I certainly welcome the opportunity. In fact, before you even phoned me, and I know that I had written down your name and number from last year, [right, yeah] and then a number of times "Ah, I should have phoned that lady and talked to her about it".
>
> Bonnie: Oh, I never knew that
>
> Lisa: And then when you contacted me – that was great. (Bonnie, Log, April 8, 2003)

Another time when we were explaining the project to another teacher, I recorded this observation in my log: "Lisa mentioned that she thought this would be an exciting project that the students would really enjoy and they both discussed how this was a class that could really get into this kind of a project" (Bonnie, Log, November 12, 2002).

Upon seeing the videos produced by the 2003 class, Lisa was very enthusiastic about what the students had produced. I recorded this entry in my log:

> I was heartened by the teacher's response to the videos – she stood up after they had been shown and complimented the students on how well they had done. She thought the students had accomplished a great deal and she was very excited about what she had seen. All along she has remarked about what a great opportunity it was for the students to be able to make a video. I really appreciate her enthusiasm and support. (Bonnie, Log, May 10, 2003)

Alternate Modes of Learning

Both Lisa and her students regarded the alternate modes of learning fostered by the project as a positive aspect of the design. Students commented often on the difference between this project and business as usual in the classroom, saying things such as: "I thought it was a lot of fun because it was more hands-on. You did it yourself and group activity was fun. I learned a lot from it" (Josh, Interview, 2004). Bill commented "I think this was better because it was funner, you didn't just sit in a desk, pay attention to the front board and take notes, it was get together, you could talk so it was more, I think it was better that way" (Bill, Interview, 2003).

Two different aspects of the difference between their regular classroom and this project stood out from the students' comments. One included the hands-on aspect of the project while the second one was the group interaction. Concerning the hands-on aspect of the project, Molly (Interview, 2003) told me, "I learn better when I'm doing something hands on – like I'm not good at just having a sheet of paper and doing it" and Jenna said:

> Jenna: you get to draw pictures and look up stuff and then you can read it all and summarize it.
>
> Bonnie: Okay, and why do you think you learn better that way?
>
> Jenna: Because you have to think about what you're going to say to summarize it. (Jenna, Interview, 2004)

> Zoe: I like things that are more hands-on because then you don't have to sit and read, because if you sit and read, there's so many things that will distract you. You'll be like, "oh, look, there's a fly on the ceiling". Then you'll like get really distracted by it, so you won't read and then everyone forgets what you've read because you're just like "oh, it's a book, whatever". But in a movie when there's action, or when you're filming, there's action so it's like, kind of fun, so you understand it more. (Zoe, Interview, 2004)

> Marcy: I think I like it better when you're doing the movie, you learn it better. In the classroom you just kind of copy things from the book and sometimes you don't even think about what you're actually writing. And you have to actually think about what was happening in that situation that we did on tape. (Sara & Marcy, Interview, 2003)

> Ethan: Interactive so we could, um, such as the PowerPoint and the video which helped us understand it more because we actually got to be in with – playing the rebellion.
>
> Bonnie: Oh, okay, so you're saying that acting it out – is that what you're thinking of in the word interactive?

> Ethan: Yes. And PowerPoint, because we got to, as I said before, understand it better because it was, um, I mean, reading the text, sometimes you don't understand it as much but the interactive, you're able to understand it more.
>
> Bonnie: Okay. Why does it make you understand it more?
>
> Ethan: You have a hands-on basis with it. And you're able to understand, okay, so this is what they were going through and these are the events which occurred at the time. (Ethan, Interview, 2004)

This idea, which the students reiterated a number of times, is quite intriguing. The implication from what they were saying, is that the normal classroom activity of reading a section, answering some questions does not involve the same kinds of mindfulness that having to read deeply in order to summarize information to create the movie. As you can see from the passages above, students seem to feel that the regular activities do not produce understanding. Indeed, one student comments: "Where just bookwork, it seems like you do one thing and it's gone, out of your memory" (Natalie, Interview, 2003). This is reminiscent of the work by Scardamalia and Bereiter (1996) concerning deep learning and understanding in the classroom. As one high school chemistry student put it:

> Learning is the input of new knowledge into your mind. I know I've learned something successfully when I've completed the question sheets and checked the answers off…. I only learn information for a short time because I think I only need it for the next test. If we don't need to know something for the test then we don't need to know it. After the test, I just forget it and think, "That's it." I just push the old knowledge aside and let all the new stuff come in. When you say "Remember back when we did this?" I think, "How are we meant to remember that?" (Thomas, 1999, p. 97)

The other aspect that students mentioned in terms of the appeal of an alternate method of learning concerned group work. Although I have discussed group work quite extensively elsewhere, the comments below seem to typify many of the students' feelings about how group work can facilitate their learning:

> I think it's fine, like, I think you'll learn a lot by doing it in groups and it's better than doing bookwork because I find that I learn better when I have long projects and you have to make a movie out of it or do a presentation about it. Where just bookwork, it seems like you do one thing and it's gone, out of your memory. So doing a project is better. (Natalie, Interview, 2003)

> I like to be able to be doing something like talking in groups with group discussions and being able to do a lot of group projects. I find that helps me learn better…if I can work with friends, it sometimes can go faster when you have more than one mind working at once. You copy down the notes, but they'll say and you put in your own input. And then later on you read through all your notes and you say "Yeah, this is – this is good". That's the way I like to learn. I don't like to just sit in my desk and read and do notes. (Troy, Interview, 2004)

> I like it better when I'm with other people because then we can discuss it and if I missed anything they can like help me with it, like to find stuff. It's like if I don't know something then they can understand, they can help me to understand it. And that helps. (Kayla, Interview, 2004)

Lisa thought the project was a good way to allow non-traditional students who often were less successful in the traditional classroom to shine in a different light. In the final interview these ideas came out:

> Bonnie: Was there a difference in the amount of depth they were able to go into from a normal activity in your history unit?
>
> Lisa: Definitely a difference in the amount of depth they could.
>
> Bonnie: Was it worthwhile to give them the opportunity to go into this depth?
>
> Lisa: **Yes** (*emphatically*) I think so. Especially for those students who really got into it, as some kids do.
>
> Bonnie: And it's interesting that it usually turns out to be the ones you don't expect to excel.
>
> Lisa: Yeah, that's true, is it? Because you've probably seen it more than I have.
>
> Bonnie: I've seen it all three years. Teachers say to me, "look what that kid did, that kid doesn't do anything. You know? [Uh huh] So, yeah, we see that. It's just that.
>
> Lisa: Well, there's kids that like doing the traditional thing. They like doing reading and answering questions and that sort of thing. [Uh huh] And these other kids who don't do well, they can't stand that kind of work. So the opportunity to do something like this, for them, well that's good because then they don't have to do that same stuff, that same way of learning all the time…There are the kids who don't do well with the regular traditional stuff, they have the bull by the horns for something like that and get right into it. [Uh huh] Sometimes they don't always do the right amount of research, but as far as doing the technology, they really enjoy that. (Lisa, Interview, April 27, 2004)

In the preceding section, I have discussed a number of barriers and facilitators that were identified throughout the project. The barriers identified involved time and technology. Implementing a research-based project in a traditional curriculum causes problems due to the amount of time required for proper research. The restrictions of mandated curriculum and scheduling in the junior high setting both caused tensions within the project. Problems with technology were also identified. The network was not designed for multimedia use and this presented problems. Changes in division technical support in the second year made it difficult to troubleshoot problems. Slow internet connections made it necessary to design supports that relied less on online activities and more on local resources, either text or locally situated on the school server. On several occasions during the first iteration, the network did not work properly. This was not a problem during the second iteration.

On the positive side, facilitators in the classroom included the teacher and students' positive perceptions about the project. Another positive element identified was the fact that this alternative mode of learning was effective for those students who do not usually do well in the traditional program by allowing more flexibility for individual differences.

In the preceding sections of this chapter I have discussed some of the barriers that were present during the project as well as some of the facilitating influences that were evident. I have also profiled the students' experiences in the project by examining their thoughts and feelings expressed in the interviews. Now that you have a fairly complete picture of the project, I would like to relate their experiences to some of the literature discussed previously in this dissertation.

Considering Students' Experiences in the Project

As a way of analyzing these student comments and putting them in perspective, it is interesting to compare the number of comments that were coded into different categories. In the introduction, I mentioned the categories of questions I asked students about the project. I asked them about project components, I asked them about suggestions for improvement, I asked them what they recalled about the Rebellion, and I asked them about the project components that helped them learn the best. It is not surprising that the most coded segments emerged concerning project elements. I coded 132 segments that described those elements. I also coded 56 segments that evaluated the project and 28 segments discussing suggestions for improvements. As I mentioned before, many of the more evaluative comments about aspects of the project, as well as the suggestions for improvements, were discussed in Chapters 5 and 6. Other comments, more related to students' experiences with the project elements found their way into the discussions relating to students' experiences of the mediated aspects of the project and students' experiences of multiple perspectives and representations of knowledge within the project.

What is surprising is the next group of segments. Although I only initiated questions about group work with 10 of the 29 students, I coded 69 segments that discussed various elements of group work including conflict, decision making, division of labor as well as a number of general comments about working in groups. Whether I asked about it or not, the majority of students talked about working with other students, with 20 of the 30 students interviewed making at least one comment about their groups. For a few students, like Bill, much of the interview centered on negative perceptions of working with a group; however, many more students commented on what they perceived to be the positive aspects of group work. One novel idea came from Jake, who said:

> When we're working together and then you're, like, talking out loud instead of just sitting there and listening - so you can, like, maybe remember somebody saying it instead of just the same voice all the time - maybe on the TV or reading it in a book you might just get distracted and not pay attention. (Jake, Interview, 2003)

If I interpret this correctly, just the fact that you hear the ideas spoken aloud by yourself or your friends can help with learning. For many of the students, the comments indicated that working with others was beneficial in terms of offering assistance, presenting differing ideas and perspectives, and increasing the likelihood of learning. Brown and Campione (1996) talk about the collaborative environment that fosters overt reasoning, so that many role models of thinking emerge. This was evident in the project and typified by this statement from Josh, who told me, "in a group you work together - say someone has a good idea but they just can't explain it well. They'll tell someone, and then someone that can explain things well can, like, put it together. Help people's weaknesses" (Josh, Interview, 2004). Grabinger and Dunlap state, "Learning is a collaborative process. Students learn not solely from experts and teachers but also from each other. They test ideas with each other and help each other build elaborate and refined knowledge structures" (Grabinger and Dunlap, 1995, p. 4). I thought that the majority of student comments indicated that they were helping and learning from each other.

The first category of student experience concerning the active construction and reorganization of knowledge, although the least-represented topic numerically, was definitely the most interesting to discover. As the designer of a constructivist learning environment, I wanted to see if the project did encourage students to engage in meaningful learning. Though the project was far from perfect, students did articulate many insights about learning that indicated we had been somewhat successful.

If you recall, in chapter 2 Brown and Campione (1996) stated that their goal in FCL was to foster a community of research practice where students felt a sense of ownership in the project, and chose its direction. In their classrooms, students read for a purpose: to communicate, write, teach, persuade and understand. In their own unique way, our students also verified the presence of these ideas throughout the project. They discussed "independence" in their learning (Kathy, Interview, 2004) and showed, in a number of examples, that they recognized the need to read for a purpose (Abby (2003), Kayla (2004), Tom (2004), Zoe (2004)).

There is a downside to constructivism as well. If you recall in chapter 1, Perkins (1991) discusses difficulties with cognitive complexity, task management and "buying in". Examples of these problems surfaced in the students' experiences as well. Zoe (2004) talks about how it was harder to learn about the rebellion because she is concentrating on script, costumes, hair, and makeup. There was no doubt that the project was much more complex than the way students were accustomed to working. The complexity of the project was mentioned by Lisa, as well:

> It's a funny kind of project so far as my own personal feelings because there are some days when I think – oh my, this is so much work [yah]. It would be so much easier just to do this a different way. Then other days I really feel good about it. You know, they're doing something that's really different. I guess maybe I'm educationally moody (*she laughs then I laugh along with her).* I don't know. I mean, I know that it's good having the opportunity to do something different. I know at the same time there are days when they probably don't even like doing it because it's challenging and it makes them work. [um hum] It's easier for them if we just fed it all to them. (Lisa, Interview, February 4, 2003)

The second problem mentioned, difficulties with task management, surfaced in the project as well. As Perkins explains,

> Typical constructivist instruction asks learners to play more of the task management role than in conventional instruction. The reason is sensible: Students are not likely to become autonomous thinkers and learners if they lack an opportunity to manage their own learning. . . . While the aim is laudable, often constructivist learning situations throw students suddenly and almost wholly on their own managerial resources. They either "hack it" or they don't, and many are so unused to managing tasks themselves that they fend poorly. (Perkins, 1991, p. 20)

Students commented on management issues such as not enough structure (Rachel, 2004) and no deadlines for postings (Emma, 2003, Molly, 2003, Marcy, 2003). They also commented on elements of management they would change within their group such as getting more organized within their group (Emma, 2003) and being more prepared (Molly, 2003). Zach had thought it all out and even had a schedule for how it should be organized differently:

> I would start it off with a couple of classes for the people to talk about scripts, to get everything ready and then I would get a class for everyone to talk over what they're doing and brainstorm with the whole class. Then the next classes I would start the script but make sure it's on the rough first then get that marked before we go and do it on the computer then I would make the script on the computer, put it on NiceNet so everyone could see it, but then I would also have one day to rehearse and one day to just do it so everyone can just get it done. One day to make props, one day to make everything so you're not rushing in on the day to make the film. And then on the day that you film you can have lots of time to edit. That's what I think, just the structure of it differently. (Zach, Interview, 2004)

Other students thought that Lisa and I should have played a more directive role: "keep an eye on them. Have people surveying the area, since there's two teachers just walk up and down the aisles making sure that you're ahead of schedule" (Bill, Interview, 2003). Student self-direction was a topic for a number of our conversations throughout the project. As Lisa said,

> Lisa: You know the whole – the concept there that you just said, of students being responsible for their own learning and that kind of stuff. A lot of kids don't want to do that because that requires work. They would rather – it's just all handed to them, right? [yup] They don't have to use those higher thinking levels then. So, some kids are challenged by that and other kids do lots of work.

> Bonnie: Yup. And by challenged you mean they're the ones that will rise to the challenge. And other ones just say No, this is too hard, somebody do it for me.
> Lisa: Exactly. (Lisa, Interview, April 8, 2003)

I talked about this idea of self-direction with several students during the interviews. As I talked to Bill about his predicament, I asked him: "what about having the students be more responsible? Is there a way to ensure the students are more responsible within the group?" He replied:

> Bill: Have a group leader, maybe. Someone that you think is cooperative and just good at making decisions. And make sure that they're on topic, so they're the group leader. Something like that might help.
>
> Bonnie: Would that have worked in your group, if you had a group leader?
>
> Bill: It depends if they listened to the group leader. Like, some people might not listen and think "oh, forget it, he's just trying to be a lead person" and they don't care but in other groups it could, I think, help. (Bill, Interview, 2003)

When I talked with Sara and Marcy, they were not sure how to get students to take responsibility for their own learning. Marcy suggested rewards such as extra points or candies. When I persisted, we had this discussion:

> Bonnie: Well, what makes you want to do something because you want to do it, put it that way, instead of for a mark? What kind of things would you do because you want to do them, not because you're going to get a mark?
>
> Marcy: because it's exciting. I don't know, when a thing. With this, it was something new and you're kinda like: Oh, this is cool and I want to start doing this, right?
>
> Sara: Yeah. When you said, Oh, we're going to do a movie I'm like Ooh. Okay, come on let's go. . . .
>
> Marcy: If you get them excited about it I think they'll pretty much do it, I know I would.
>
> Bonnie: So how do I get them excited? There's the question.
>
> Marcy: Well you mention movie and they're like "Ahh."
>
> Sara: Or you could just say, like, "You have to find all this research or something, so you can make a movie, but if you don't find it then you won't do it. . . .
>
> Marcy: It's just like, threaten them. . . .
>
> Bonnie: Now I'm the big bad teacher again. I don't want to be the big bad teacher.
>
> Sara: I don't think people will think that.

> Marcy: they'll just feel that, well, this is the way that's fair. (Sara & Marcy, Interview, 2003)

This discussion dovetails nicely with third difficulty mentioned by Perkins (1991). Lack of student "buy in" was somewhat present in Year 1."You got people that just wanted to have fun and they didn't care about learning" (Bill, Interview, 2003). It was much more of a pervasive issue in Year 2. As noted previously, from the very beginning students seemed unmotivated and lacking in enthusiasm for the project.

Despite the problems that surfaced, students seemed to indicate that the project had been a valuable learning experience for them. As I said previously, the word "fun" was used on numerous occasions. Only one student thought it would have been better to skip the project and just read the textbook to learn about the rebellion.

I would like to turn now to an examination of the aspects of technology use in the project by discussing the ICT goals and their implementation.

Meeting ICT Goals

At the beginning of chapter 5, I mentioned that Lisa had identified some ICT goals as a part of this project. Strangely enough, as we evaluated the project in both years, we never examined whether we thought we had achieved these goals, which included improving technical skills such as computer conferencing, Internet use, video production, and digital editing in order to integrate ICT objectives into social studies. Perhaps this is a consequence of the fact that we were focused on student learning as we evaluated the project. Technology was a means to an end, not the end itself. Although I have discussed some of the dysfunctional aspects of using technology previously in this chapter, I have not looked explicitly at whether technology was integrated into social studies in a meaningful way. Disregarding slow Internet connections and the occasional network glitch, for the most part students were able to access computers to find information, communicate with others and post their summaries on NiceNet. In Year 1, the students mentioned the links in NiceNet a number of times as useful ways to find information for their project as in this discussion. Natalie (2003) told me, "NiceNet was good because you had downloaded all the sites there so that they were all there for you". She also said, "I found so much information in the links about how the Indians were starving and about Big Bear and Poundmaker and stuff" (Natalie, Interview, 2003). Alex said, "the NiceNet posting was good, because everyone could post and then people could go and find out about it, so that was useful" (Alex, Interview, 2003), and Vicky confirmed that, "NiceNet, posting summaries did help finalize what you remembered so you could implant it in my brain" (Vicky, Interview, 2003). Students in this iteration also conducted their own independent research on the Internet and posted the results in NiceNet.

Students also mentioned its use for communication with their fellow students. For example, Nick told me "we used it a lot, we're still using it actually, I'm still talking to people. . . . I still use it at home. I don't really research anything that way but I still talk." (Nick, Interview, 2003).

In Year 2, the rebellion website was mentioned a number of times as a useful source of information. "The website was pretty good . . . they were nicely categorized. And the map was neat, you could just click on the people or events that happened" (Rachel, Interview, 2004). Another student said, "And the rebellion web site was pretty good. I thought that had lots of stuff that helped me" (Tom, Interview, 2004). When I asked Sam about the primary resources from the website, he said, "I used those in my script, the perspectives for the Duck Lake battle. That was useful information. I used a lot of it so I found it useful because it's right there where I could get it" (Sam, Interview, 2004). We also noticed that, in this iteration, the Snitch Lounge was frequented by students for personal communication as well.

In both years, students were able to access the online resources, find information, read summaries, and communicate with each other. For this reason, I believe we were successful in meeting the ICT objectives for computer conferencing and Internet use. So far as the other technology objectives concerning video production and digital editing, we were not quite as successful. I was satisfied with the results of the lesson that taught students about video concepts using the Heritage Minutes videos and students did comment favorably about the lesson, saying, "With the video, the video treatment and the script and all that it did help me understand how to do the stuff and actually partially know how to make a movie now" (Vicky, Interview, 2003), and "I liked watching those Heritage Minutes and learning how you actually make really, really short movies" (Troy, Interview, 2004). Compared with the experience that Marie's class had when they were all able to work through the iMovie tutorial and try digital editing, I felt that the objective for digital editing was not very well covered with these students. However, they did learn how to make a movie and found it an enjoyable and a learning experience. For this reason, I think we were fairly successful at integrating these objectives into our project.

The following section will foreshadow chapter 8 by alerting you to some challenging elements that arose during the project.

Challenging Elements in the Project

Implementing a theory based innovation such as constructivism can be very challenging in a traditional classroom setting (McLaughlin & Mitra, 2001; Shulman, 2004). Roles for students and teachers change dramatically as students are required to take charge of their own learning and teachers must supervise a classroom that is much more complex and difficult to manage. Administrative restrictions such as curriculum dictates and timetabling made it difficult to spend the time necessary to foster the deep learning and engagement we were working towards. As a result of my data analysis and reflection, I identified four elements that emerged as items needing further consideration. These elements included (1) an understanding of how constructivism would work in the classroom; (2) the need for a deep knowledge of history on the part of the teacher; (3) the challenge of using primary historical resources; and (4) the skill set needed to write and produce a video. I will explore these challenges in detail and discuss some changes I would make in the project to address these challenges in chapter 8.

Summary

This chapter has presented data about student experiences in the project as well as aspects of the project that created barriers to implementation and those aspects that facilitated the project. Following in chapter 8, I will reflect on my experiences, both positive and negative, as a designer/researcher. I will also make some recommendations for future changes, based on my reflections. Chapter 8 will also examine developmental research as a process in its own right.

CHAPTER 8: DISCUSSION

In this chapter, I will examine the experience of design and research inherent in the process of developmental research. To do that, I would like to consider the following research questions:

What can be said about my experience as a designer/researcher occurring as a result of the developmental research process?

What can be said about the design model used during the developmental research process?

What can be said about developmental research as a process for design, development and implementation in the classroom?

To address these questions, in the first section of the chapter I will discuss my experiences as a designer/researcher. I will also profile the changes I would make as a result of those insights. Following that, I am going to discuss my experiences with the R2D2 instructional design model. I will also reflect on the process of developmental research. Finally, I will conclude the chapter with some recommendations for further research.

The following analysis is not based solely on a thematic analysis of data; it is also based on my understandings and reflections as a result of having carried out this project. The insights I have gained may be useful to others who may want to try this type of project in the future.

My Experiences as a Designer/Researcher

As a designer, you are always looking for ways to improve your design. Because of this, you tend to focus on the negative aspects of the project and what needs to be changed. However, it is also important to recognize the positive experiences as well. In this section, I will consider both as I discuss my experiences as a designer/researcher during this developmental research project. First, I will profile what I consider some problematic aspects of this project and then discuss changes to address those problems. In the latter part of this section, I will look at some of the positive aspects of the project.

Problematic Aspects of this Project

As I reflected on my experiences, I identified several problematic aspects that arose during the research. I will discuss a number of challenging elements that contributed to the complexity of the project, the tension between design and research that I felt when conducting developmental research, and my experience of role overload while undertaking this research.

Challenging Elements

This project encompassed a number of elements that required change on the part of teacher and students. Because these elements were foreign to the classroom's normal operations, they required considerable time and energy to implement. These elements concerned: (1) an understanding of how constructivism would work in the classroom; (2) the need for a deep knowledge of history on the part of the teacher; (3) the challenge of using primary historical resources; and (4) the skill set needed to write and produce a video. I would like to introduce these elements briefly now, and discuss them in more depth in the section on changes later in the chapter.

Understanding of Constructivism

In this project, we attempted to switch from traditional classroom activities to constructivist ways of structuring the activities. Students were expected to take control of their own learning, decide on an event, write a script and act it out. They were also asked to read and evaluate primary sources as a way of deciding what their vignette topic would be. They were also required to do this while interacting in an effective way with their fellow group members. The teacher's role changed from a fairly directive role to a much more guidance-related role. In the regular classroom, Lisa would often work through the text by asking students to read a paragraph at a time and then she would comment on important points or explain puzzling sections to the students. The process within the project required a great degree of independent activity on the part of the students. The students needed to be able to work independently, negotiate with fellow students about script topics and content, as well as to regulate their own behavior. The change in classroom organization was a major challenge in the project.

Deep knowledge of history

While the regular classroom treatment of the Riel rebellion would involve the reading of about ten pages of textbook material, with the students required to answer a series of questions at the end of the chapter, perhaps a short activity around the topic and the likelihood of several general content questions on a unit test, our project required students to watch at least four days of video about the rebellion, read the text chapter, examine a computer-based timeline, read first hand materials (magazine articles, excerpts from autobiographies or books of the period and other primary sources) and from those readings, come up with a topic for a video vignette about an event during the rebellion. Working with a topic in this depth required in-depth knowledge of what happened during the rebellion.

According to Bransford et al. (2000), teachers need to have a "deep understanding of the subject matter and its structure, as well as an equally thorough understanding of the kinds of teaching activities that help students understand the subject matter in order to be capable of asking probing questions" (p. 188). They also state that:

> expert teachers have a deep understanding of the structure and epistemologies of their disciplines, combined with knowledge of the kinds of teaching activities that will help students come to understand the discipline for themselves. . . . this point sharply contradicts one of the popular - and dangerous - myths about teaching: teaching is a generic skill and a good teacher can teach any subject. Numerous studies demonstrate that any curriculum - including a textbook - is mediated by a teacher's understanding of the subject domain. (Bransford et al., 2000, p. 163)

When I was researching the event and putting together the resources, I probably examined at least 5 full-length books, many letters, petitions and other documents as well as about 40 journal articles about the events. I also spent two weeks traveling around Alberta and Saskatchewan, where I visited Fort Pitt, Fort Battleford, Fort Carleton, Duck Lake and Batoche in my search for information about this project. I also spent numerous hours on the web looking for high quality materials and pictures of the events. By the time I had finished this process, I had a pretty comprehensive understanding of the rebellion.

However, the typical classroom teacher in junior high usually has from 5 to 8 different subjects they need to prepare to teach, plus all the other teacher activities such as marking, test preparation, report card generation as well as the expectation that they will be available to students for such things as extra help, extra-curricular activities, events throughout the day, and supervision at noon hour and recess. Becoming a subject expert takes time and develops over years. If a teacher is not a history major, then it is unrealistic to expect that they would acquire that expertise very quickly when they are faced with the myriad of other duties required of them.

Marie, with her greater depth of knowledge was able to scaffold students by recommending resources, asking questions to focus student research and providing culminating activities to bring out students' understandings. However, Lisa, a teacher working outside her area of subject expertise with only three years experience teaching social studies at this grade level, did not have this depth of background knowledge at the beginning of our project. Because I had spent the time to learn all about the rebellion, Lisa often deferred to me as the content expert. Taking on this type of role in the classroom interfered with my role as a researcher, as I will explain later.

The difficulties inherent in using primary research materials

This project attempted to alleviate the problem of the 'mile-wide inch-deep' curriculum (Schmidt, McKnight & Raizen, 1997) by allowing students to research an event in depth, using primary source materials. There are a number of difficulties involved in using this approach. First, primary source materials from the era of 1885 use language that is often unfamiliar to students of this era.

The accounts we read were often difficult to understand. Students reading at a lower reading level sometimes found it difficult to accomplish anything. For example, regarding reading articles to post on NiceNet, one student said to me, "I'm a slow reader so I didn't really read the whole thing in the whole class and then I'd forget it and I'd have to start over" (Jake, Interview, 2003).

Another problem that concerned me was the imbalance of materials. There were many accounts of the events written by various whites, accounts from soldiers and those from captives. Of course, these accounts represented the white perspective on events. Very few accounts were recorded from the First Nations or Metis point of view. I thought the Canada, a People's History videos did a fairly good job of representing other viewpoints, but the majority of primary source written materials I could find were definitely skewed towards the white perspective. We did receive permission to include curriculum materials written by Blair Stonechild that profiled the lives of Big Bear and Poundmaker, but these were curriculum materials developed by the Saskatchewan Indian Federated College for students, not primary materials.

Learning Video Production Skills

Since neither the teacher nor the students were familiar with video concepts, the project required extra time for students to learn about these concepts. In the second year, as well, students were unfamiliar with script writing, so that needed to be added in to an already time-consuming project. The requirement for backdrops and costumes added still more complexity to the video portion of the project, especially since space was only available for shooting in a very narrow window of time that did not coincide with the historical sequence of the topic in the curriculum. This made the project even more difficult to manage. Because I was the only person with expertise in this area, it fell to me to be the instructor for this part of the project. This was very problematic for me, since, when I was the teacher, it was very hard for me to carry out my role as a researcher as well.

The Tension between Design and Research in Developmental Research

Sometimes you can't see the forest for the trees. It was easy to get caught up in the minute details of design and miss the big picture. I had this idea in my mind that I would design something elegant and engaging that would make learning about the rebellion a pleasure. This project would be motivating and students would enjoy using it so much that learning would follow just as just as Lehrer's students acquired a deep understanding of their subject through web authoring (Lehrer, 1993).

I was so caught up in designing and producing resources for this project, I found myself spending the bulk of my time considering that. This meant that I spent less time considering what I needed to do for the research part of the developmental research cycle. From my log:

> It's so easy to get distracted from the real purpose of doing this dissertation. I have been so focused lately on resources that I have completely lost touch with the original intent. I find that I tend to do the easy things – digitize pics, look for primary resources, but this does very little to focus on the real question from this whole dissertation. What does an effective constructivist learning resource look

> like? (I'm not going to use the word environment any more – it seems much too pretentious for what I will end up with. My feeble effort seems like such a non-thing when I compare it with things like Jasper or FCL.) I need to stay focused on what I have to do in this dissertation process, not get lost in the details of design. (Bonnie, Reflection, September 9, 2003)

As you can see from the preceding quote, design concerns were often foremost in my mind. This was a problem for me because, as I stated above, I often tended to focus on the easy, design-based things to the detriment of the research portion of this project. I suspect that some type of imbalance between considerations of design and research might often be a problem for the single designer/researcher attempting to do both within the scope of a research project. It definitely was a problem for me.

Designer/Researcher Role Overload

Developmental research is a very challenging form of research. Not only do you have to attend to all the details involved in conducting the research, you also have the extra work involved in designing an artifact for study. You need to carry out the theoretical research related to the design work. Then you have to design an artifact, test it out, and make revisions based on the information received during the formative evaluation of that test. At the same time, you have to be attending to the regular research activities of observation and analysis, which would normally be the full extent of activities for a researcher.

During the volunteer project in Marie's classroom, the responsibility for design and implementation was shared. Marie provided expertise in constructivist classroom management and history, while I developed the technology supports needed for students to learn scriptwriting and video operation. Since I did not have ethics approval when I was working in Marie's classroom, I did not carry out any formal research activities, other than being present during the project and seeing what went on in her classroom. My role in her classroom was restricted to design and a minimal share of instruction, which was manageable for me.

In Lisa's classroom, in addition to my role as researcher, I also ended up being the subject matter expert for three different strands, the history, the constructivist activities in the project, and the technological activities surrounding both online communication (NiceNet) and the video. This meant that I had to teach some of the classes, which in turn required managing student behavior and that adds a considerable amount of stress. I found it very difficult to do everything - design, teach, discipline and think about research - so research was often subjugated by things that were more 'in your face' types of activities. It is very difficult to take the time to reflect on what has just occurred during a typical teaching day. Things fly by so quickly when you are dealing with all the demands that a large number of students and a limited amount of time for interaction with those students entail. At the end of one of these sessions, I would be so exhausted that all I wanted to do was go home to bed. I did not want to sit and reflect, or write notes, or anything. I would force myself to write observation notes, but that was as far as I could force myself to go.

I think this quote from Lee Shulman aptly captures the essence of what it is like to be put in that precarious role – the classroom teacher.

> The more time I spend in classrooms with teachers - talking with them, observing, watching videotapes, talking some more, reflecting on my own teaching - the more I peel off layer upon layer of incredible complexity. After some 30 years of doing such work, I have concluded that classroom teaching - particularly at the elementary and secondary levels - is perhaps the most complex, most challenging, and most demanding, subtle, nuanced, and frightening activity that our species has ever invented. In fact, when I compared the complexity of teaching with that much more highly rewarded profession, "doing medicine", I concluded that the only time medicine even approaches the complexity of an average day of classroom teaching is in an emergency room during a natural disaster. When 30 patients want your attention at the same time, only then do you approach the complexity of the average classroom on an average day. (Shulman, 2004, p. 504)

So, in addition to the inherent complexity of the classroom, in my case I also added in the extra roles of designer and researcher. In my experience, this confluence of activities leads to role overload. The following sections will discuss ways to lessen this overload, as well as examining other areas for improvement.

Reflections on the Project and Suggestions for Change

After the project was over, as I reflected on what had transpired, I realized how complex this project actually was. I was focused to a large degree on design and expected that if the materials were comprehensive, that would be enough to ensure success. I did not consider the complexity of the project in terms of the amount a classroom teacher would have to learn in order to feel comfortable doing this project. During this time of reflection, a friend asked me what changes I would make if I were to carry out this project a third time. As I thought about that question, there were a number of aspects of the project that surfaced as areas that needed improvement. In the following section, I will discuss those reflections and suggestions for change.

Fostering Constructivism in the Traditional Classroom

I believe now that Lisa and I fell into the trap that Mintrop (2004) discusses in his article about social studies teachers who are trying to implement an FCL classroom (Brown & Campione, 1994). In discussing what he observed, he stated "Rather than thinking conceptually, the two veterans thought of curricular content and student learning in terms of students activities and tasks to be completed. . . . Instruction centered on task completion and learning activity, rather than on inquiry and learning concepts" (Mintrop, 2004, p. 151). Schoenfeld also echoes this idea, in his discussion of the Mintrop article:

> building a research culture is hard. There are multiple dimensions to this. Building a research culture includes teaching students to frame questions that are meaningful and answerable, helping them learn to find useful sources of information and then to unearth the relevant information from it. It involves developing skills of collaboration and communication. Each of these skills is a major endeavor in itself; trying to do them all at the same time is extraordinarily difficult. (Schoenfeld, 2004, p. 241)

I did not read these articles until after my research was already completed, but it struck me as what had happened with our planning process. We spent our planning time creating activities for the students to carry out, but we never did discuss the concepts that we were actually trying to address with the activities. We never did discuss what changes would be required in a constructivist classroom. For my part, I thought that if we had enough activities for the students to do, those activities would be the catalyst for student learning.

I realize now that I did not have an expert understanding of how to foster a constructivist classroom. Although I had spent some time in Marie's classroom, it was too short a time to do more than give me a tantalizing glimpse of how a constructivist classroom operates. Even though I had spent considerable time researching constructivism, I still had a very idealized notion of how it would actually work in a real classroom. My notions of how to implement such a process were based on descriptions of projects such as Jasper (CTGV, 1997) and FCL (Brown & Campione, 1996) and those descriptions do not discuss the everyday workings of a constructivist classroom or highlight the steps needed to change a traditional classroom into one that values constructivist activities or norms. I know now that I tried to introduce a new philosophy of classroom organization into a traditional setting without a clear understanding of what support structures were prerequisite to a change of this magnitude.

We needed more discussion concerning constructivist ideas and how they would play out in the classroom. We never had those discussions before the project started and our meetings throughout the year focused more on planning aspects such as scheduling, numbers of students in groups, content of assignments, and later, changes for the next iteration. We never talked specifically about how a constructivist classroom would differ from a traditional classroom and what kinds of activities would facilitate the change. Prawat (1992) reiterates this:

> Most of the problems associated with implementing a constructivist approach to teaching could be overcome if teachers were willing to rethink not only what it means to know subject matter, but also what it takes to foster this sort of understanding in students. This is a tall order. Such change is unlikely to occur without a good deal of discussion and reflection on the part of teachers. (p. 36)

We also never talked about the fact that constructivism is not something you can parachute in for one project in the middle of a traditional classroom environment. It involves a radical shift in the way classroom structures are organized, as well as a shift from transmission mode to facilitative mode on the part of the teacher, and a shift from passive absorption to active acquisition on the part of the students.

So, why didn't we have these discussions before we began the project? In reflecting on this question after the fact, I realized that I had assumed Lisa's classroom was more constructivist than it actually was. I knew that she was involved in a division-wide innovative social studies project so I assumed that this type of learning had been discussed within the group. When I first observed in her classroom, she was involved in a geography project that appeared quite constructivist – it required students to design an itinerary for a rock band and conduct geographical research on various areas they would be visiting. To me, this appeared to be evidence that Lisa felt comfortable in this kind of environment. What did not come to light until our final interview was the fact that this geography project was an anomaly in her classroom rather than the norm. At that time, she told me:

> My classes are pretty traditional. I use the textbook. You know, I rely on that, the students do mostly written work - they don't do a lot of work where they have to do research on their own. There's some projects like that throughout the year but, yeah, it's pretty traditional. (Lisa, Interview, April 27, 2004)

We never had those discussions for two reasons. First, I was always very conscious of the time element when working with a classroom teacher. As a former computer consultant and classroom teacher myself, I was acutely aware of the heavy demands placed on a full time teacher. It was very difficult to find a participating teacher to work with initially, so I was fearful if I placed too many demands on her free time, she would decide not to participate in the project.

As for the second reason, at the time I did not think these conversations were necessary. When Marie and I explained our project to the teachers' group, it was represented as a constructivist project. As a result of that presentation, when Lisa volunteered to work with me, I thought this meant that she was comfortable in a constructivist environment. The irony of this situation was that even though I had spent a number of days observing in Lisa's classroom, I was there for the one project that was not typical of her regular classroom operation. I based my assumptions about her classroom operation on those observations. In retrospect, I realize I should have initiated a dialogue about constructivism before we even began to plan our project. If we had, I might have realized how much Lisa's classroom operation differed from what we tried to implement in the project and we could have examined how classroom structures would have to change to accommodate this different philosophy.

If I were to do this project again, I would try to engage the teacher in some more philosophical discussions right from the very beginning, even before we started the design process in order to develop that shared understanding I discussed in the participatory design section of chapter 2. I also think it would be very beneficial to have a constructivist teacher available to mentor us during the process. This teacher could make suggestions for design, but if possible would come into the classroom and make suggestions as to how the classroom could be structured, what student activities would be useful, and how the time and curricular pressures could be handled. As an example, here's what Marie told me she would do to work towards the realization of this kind of a learning environment:

> You move to constructivist learning by taking small steps. The first thing that I think is essential that you do is you, yourself, commit to it and say by three months into the year I wish to be here, by six months into the year I wish to be here, and always keep focused on why you're going to do it because it could be very frustrating because it's something that's a risk for the students. If they've always had someone else do their thinking for them, they're not used to it, and they have to accept failure because one of the things that is in a constructivist classroom is the ability to fail and come back to it and try it again. It's very important that there be a risk-taking environment and understand that that's part of learning –to try things that may or may not work.
>
> Another thing that must be in a constructivist classroom is–in evaluations you evaluate the process. You don't always evaluate the final product. That doesn't mean that that the final product doesn't have some weight but a typical example may be that 80% of the mark on the project would come in the process and 20% on the final product. . . the first thing that you do is you try to establish cooperative learning classrooms. Do that first by having numerous activities, perhaps five one minute activities in a day where students are required to share their thoughts with another. And then it's required to have some kind of accountability – group accountability and individual accountability So in the group they might be required to present a project or a very small process or explain why they think something or tell the differences between what they think. You're training them to listen, you're training them to think and you're training them to back up their thoughts. They're not mimicking someone else and not just used to recall, they're doing something more and so you need to build in questions or time periods where you're doing higher order thinking – HOTS, Bonnie calls it (*I laugh*) - and application, synthesis, evaluation are extremely important as tools and have to be taught. So the risk-taking has to be in there and there has to be a teacher and classmates who are saying "It's okay to try, it's okay to give the wrong answer" and so that has to be established and that takes time because most often, in my experience, the students are not used to that, the students are used to rewarding someone for the right answer.
>
> Once you've established that, you build into longer and longer periods of group activities, meaning that you go to a 5 minute activity, then go to a 10 minute activity and you're constantly moving the students, not rapidly but on a daily basis, into different modes of learning. So, they get direct instruction, and they get group work, and they get individual seatwork that's quiet, and they get times where they're instructed to be noisy, and they get times where they're instructed to interact with someone in a quiet way, and they get times when they're instructed

> to present, and they get times where they're using hands-on material, and times where you're giving them worksheets. They get to know that all of this is learning and all of this is valid and that there are differing rules and differing standards for each one.
>
> But back to accountability-they know that every time they do something they're required to participate and oftentimes you build in a mark for that to reward that and say this is very important to it because oftentimes students equate marks with what's important in your class. [Right] Then when you've got them participating and feeling comfortable with risk-taking, then you start to build in mini-projects, projects that take more than one class; and, hopefully, projects that cannot be completed alone; projects that go beyond what the curriculum seems to ask in a single outcome. And so, when those projects are then evaluated by the students- and what I mean by that is that they have an active part in saying what should we be looking at to evaluate in this process and in this final product-then the teacher has a clear idea of what's most important to them.... The teacher does not abdicate their role in determining why you're doing it and what value it is but you can negotiate what skills are being learned and which ones you're evaluating in that context with a goal. . . .
>
> Once you've built in the risk-taking, the projects, the working together, the evaluating... then you continue on and work towards whatever it is that you want to do. You're constantly judging what in the environment may be affecting the students and making the task, I want to say more complex, but that depends upon what you're teaching. So you want to take a number of objectives from the curriculum and put them together as a group and see if there's some product or process that you can go through to achieve those. In social studies you do focus on the knowledge objectives, but you focus more on the attitude and skill objectives in a highlighted way and then carry them out. . . . If you overlay the ICT outcomes, then you have knowledge, skills, attitudes and ICT so you have another dimension that's working there but it works well because it's in the higher order thinking skills. It often works best if there is a collaborative approach where students are helping each other and sharing what they do know and celebrating that rather than focusing on what they don't know and trying to hide it. (Marie, Interview, June 20, 2003)

These insights come from actually working with students year after year to achieve this kind of classroom environment. Marie emphasizes the fact that taking students who are used to the traditional textbook-oriented form of learning to a knowledge-building classroom is an incremental process that involves changing classroom norms to those that reward risk-taking and interdependence. It also involves practicing group skills that many students will not have when they enter that classroom. By making students partners in decisions about evaluation, they know that they are in control of their own learning. Having an experienced constructivist teacher like Marie available during our project would have been very useful since she could have offered practical advice about the classroom that I was unable to contribute. My knowledge was theoretical, and although I knew the kinds of structures I wanted to see in place in terms of what the literature said was necessary, I didn't actually know how to bring them about.

The one element that Marie did not mention above is the importance of student reflection in this process of moving from traditional to constructivist classroom. In Marie's class, she would often take several minutes at the end of a class to have students write a short note about what had gone well that day and what they had learned. She would also often have a short discussion at the beginning of class focused on the process; students would talk about problems with their research or comment on activities that had gone well or needed improvement. During an action research project, I observed a teacher using the reflective process to help students acquire metacognitive awareness by asking them to journal about how they learned best.

A fellow teacher with whom I discussed my project sent me this email concerning her thoughts about how one would switch to a more constructivist class arrangement. I thought it captured a lot of the thoughts and questions that would occur to a teacher thinking about theory-based change:

> I was asking myself, as a teacher, what can your experience tell me? First, if I want to learn how to become a constructivist teacher, I will have to be willing to make a big shift in my teaching. It is not something I can add to my toolkit to be used only when appropriate. It is something that I will have to infuse into all of my teaching. But, I need to make that change slowly. I shouldn't start with a big project. I should find ways to introduce some of the pieces into my teaching. I wonder what that would look like? What small pieces should I start with? Some things that come to mind: looking at ways to help my students work more effectively in groups, assigning tasks that give my students more freedom and ownership of their work, looking for ways to encourage inquiry, and of course, watching to see how it works and how I can improve my skill at it. Third, not only do I have to slowly develop those skills, I need to help my students slowly develop the skills they will need to be successful in that environment. So, what are the ways that I need to support them, guide them, scaffold the process for them to get where I need them to be in order to do a project such as this? (A. Meckelborg, Personal Communication, February 11, 2006)

As I read this passage over, I ask myself now, why didn't I think about these things more deeply during our project? Why didn't we discuss the changes in student attitude and behavior needed to foster this type of classroom? I can only reiterate my previous explanation that I thought the activities we designed would be sufficient to accomplish the change. By giving students the opportunity to direct their own learning, I thought the constructivist environment would naturally follow. But students were unfamiliar with this mode of operation and unsure of their roles. They were used to a very structured classroom where their inquiry was often bounded by what appeared on the pages in their textbook. Only now, after reading about the experiences with the FCTL program (McLaughlin & Mitra, 2001; Mintrop, 2001; Shulman, 2004) and further discussion with Marie, do I realize that we needed to have these discussions before the project ever began.

The Acquisition of Deep Historical Knowledge

As mentioned earlier, teachers need to have a "deep understanding of the subject matter and its structure, as well as an equally thorough understanding of the kinds of teaching activities that help students understand the subject matter in order to be capable of asking probing questions" (Bransford et al. (2000), p. 188).

This was somewhat of a dilemma for me. When presenting the idea for the project, I had always taken ownership for the acquisition of knowledge in my role as the resource designer. I told Lisa I wanted to design a resource, and I never asked her to become the content expert. I did give her several resources to read including a very interesting book filled with first hand accounts of the rebellion. I also brought in many journal articles and excerpts for the file box that the students accessed. However, I did not feel that it was my place to require the teacher to become as knowledgeable as I was about the events that took place. I hoped that she would want to learn more about the rebellion since we were placing so much emphasis on it in the project. At one point after the first iteration, I expressed the hope that I could relinquish my teacher role:

> Bonnie: I'd really like to take less of a role next year anyway. I'd like to be the researcher [I understand] while you do the organizing and that kind of thing and then the kids will perceive it differently too, instead of "well, yeah, she's doing all this stuff. [Right]
>
> Lisa: and I think I can take on more of that role, too, because I'll feel more comfortable with it and after watching you and what you did, I think I'll be able to take some of this research stuff for sure and use that. And if we use NiceNet

> again, I think I can handle that to some degree, if you're helping behind the scenes.
>
> Bonnie: So, now, I'm hoping that you will be doing most of the guiding and I'll be able to sit at the back and do my observations this time around, okay?
>
> Lisa: Yeah. [Great.] I'm just not going to be the expert when it comes to content, that's your job. (She laughs)
>
> Bonnie: Right, right and hopefully everything will be laid out well enough that neither one of us has to be the expert on content, it'll be the kids finding the stuff out to be the experts. (Lisa, Interview, May 29, 2003)

As you can see by this interchange, even after the first iteration was completed, the teacher still regarded me as the content expert. This in turn meant that I had less time available for observation. During the second iteration, I spent all my time in a teaching role when working with the 7/8 split class. When the full class was working in the computer lab, Lisa would stay in the classroom with some of the students while I supervised those in the computer lab. This diverted my attention from my research activities and added to my feelings of overload during the project.

During my two years spent as a researcher in Lisa's classroom, I attended a division social studies teacher meeting. The teachers were examining ways to incorporate technology into their teaching. At one point, they were polled on how many years they had been teaching social studies. I was amazed to learn that, of the eight teachers represented, Lisa, with three years of teaching experience, had the most experience teaching that subject. I got the impression from the discussion that very few of these teachers were subject specialists. The problem of teachers working outside their subject area is a very real difficulty at the division III and IV level and presents a real barrier to the introduction of complex innovations such as constructivism. This is an issue that needs to be addressed systemically. Given the fact that many school divisions place teachers into positions for which they have not had the prior training, there need to be structures in place to ensure that those teachers have opportunities to upgrade both their subject knowledge and their pedagogical content knowledge (Shulman, 1986) without being penalized for their shortcomings. With the flexibility and rich resource base of the Internet available, I don't believe it would be too difficult to design some type of on-demand in-service program that could provide access to the needed information and skills. Darling-Hammond and McLaughlin (1995) state that professional development needs to be "collaborative, involving a sharing of knowledge among educators and a focus on teachers' communities of practice rather than on individual teachers" (Para. 6) so having access to an online community of teachers working in the same subject area might be beneficial as well. I also think there would need to be incentives to entice these teachers to put in the amount of work needed to develop their subject specific skills.

Supporting Students in the Project

When I first conceptualized this project, one of the reasons I chose the topic was based on its relevance. The retrial of Louis Riel had been covered in the news, and it occurred to me that it was a historical issue that might be a little more interesting to students. However, shortly after the project began, as a result of a conversation with an experienced grade 8 social studies teacher, we decided to focus less on the current relevance of the issues and instead, focus on the idea of the investigative reporter as a way of tapping into students' previous learning. We reasoned that students are surrounded in their everyday life by examples of news reporting so this would be something familiar to them and would be a starting point to their investigative work. By asking students to take on the role of reporter and looking for the reasons behind the rebellion, we had hoped this would make the project more authentic and more motivating. One student I interviewed thought it did. He said:

> It made some people more - they tried harder - cause I know some people who just kinda said "Oh, we're on the net, let's play games" but some people figured, oh a reporter, we might as well try hard and do our best. You wanted to find it in more depth and try to be the best reporter. (Nick, Interview, 2003)

However, many students, especially in the second year, never really put themselves in that role at all. Upon reflection, I feel the students needed much more scaffolding than they were given in working in that role. We should have spent more time developing the reporter's role by focusing on the need to ask questions of the data. For example, King suggests that "when children use questions that guide them to connect ideas within a lesson together or connect the lesson to their prior knowledge, they engage in complex knowledge construction that enhances learning" (King, 1994, p. 361). We did spend a short time during the introductory session talking about the kinds of questions a reporter needs to ask, but we needed to extend this further into the data gathering process. For example, some of the data gathering came from watching Canada, a People's History. I think students needed more guidance in terms of providing some focusing questions before the students watched the videos. Although the idea of the NiceNet summaries was included as a way to get students to pay more attention to the information in the videos, in reality, they didn't seem to get enough out of their viewing experience. If they had been given focusing questions before they watched the video, and if they had been debriefed immediately after watching, that might have helped them to focus more on issues.

Schwartz and Bransford (1998) suggest that you need to have a challenge or a puzzle for students to try or attempt to solve before you give a lecture because it makes the information given in that lecture more meaningful. It activates the information from the lecture because the students are actively putting it into use and means that it is more likely the student will be able to use the knowledge in a meaningful way to solve other similar problems. How does this relate to making history meaningful? Students need to be detectives, solving the mystery of why people acted the way they did. To do this, they need to find out the circumstances surrounding the act, which requires delving deep into the social structure of the time, in effect, putting themselves into the place of those people and experiencing what life was like in that time. Giving the students better tools, in terms of questioning skills, and focusing their attention before and after the videos may have facilitated this deeper analysis.

We might also make use of the timeline as an advance organizer (Ausubel, 1963) for the project. As the class examined the timeline, we would try to generate many questions concerning the events and why things happened. This might also help the students gain some practice in their reporter's role as they generated and discussed these questions. At the same time, we could also point out which events might make good vignettes, because trying to identify an event to write their script about was one difficulty the students mentioned.

Support for Primary Research

I have also given some thought to the problems inherent in using primary research materials. Regarding the dearth of written primary sources for First Nations or Metis in this project, one possible solution might be to conduct interviews of family members or elders to glean what information about the Rebellion has been passed down orally.

To address the problem of materials that are difficult to understand, I thought it might be possible to have students work together in a group to read some of these resources cooperatively, either by dividing the reading up into portions and having each student summarize and discuss their own portion back in a summary group session, or by using a form of reciprocal teaching (Brown & Palincsar, 1989) where they would read the passages out loud and discover the meaning together through discussion. This might alleviate some of the difficulties for those students with lower reading levels. Lisa had suggested taking some of the longer resources and simply highlighting what we thought were the most important passages to reduce the amount of reading for students who read more slowly. In this way, they would still experience the story in the original author's own words. Conversely, perhaps we could provide some of the anecdotes written at a lower reading level – the gist of the story would still be there, but the vocabulary would be more accessible. Hopefully, these ideas would still make the history come alive while alleviating some of the problems when using these resources.

Emphasis on the Video

Another point for reflection concerned the emphasis on acting out an event that occurred. The reason this activity was included in the project was two-fold. First, it was my belief at that time that making a video would motivate students to find out about the rebellion in detail. As several students pointed out in their interviews, it was impossible to write a script about an event without first learning about that event in detail. The second reason I thought that making a video was a good idea came from the activity structure of consequential task or activity introduced in FCL (Brown & Campione, 1996). As Bruner reminds us:

> Works and works-in-progress create *shared* and *negotiable* ways of thinking in a group. . . . Externalization produces a *record* of our mental efforts, one that is "outside us" rather than vaguely "in memory". . . . "It" embodies our thoughts and

> intentions in a form more accessible to reflective efforts. The process of thought and its product become interwoven. (Bruner, 1996, p. 22-3)

Students were very proud of their videos. When we showed them in class, they asked to see them over again. They were proud of their accomplishments and enjoyed the public presentation. Many students requested copies to take home to their families and show their friends. One student in the first year told me that she hoped we would be doing the project again in the following year because her brother was already looking forward to being involved with it.

While I still think this was a good way to motivate students to delve into an event in depth, some students seemed to miss the overall picture of what happened in the Rebellion. Although the project resources did include a number of overview types of resources (PowerPoint Timeline, CaPH videos, textbook reading), some students told me they best remembered the event for which they produced their video. For example, Tony, (Interview, 2004) said "what comes into my mind the most was the video that we made and Fish Creek" while Kathy commented, "I learned quite a bit about Frog Lake, because that's what I did our script on" (Kathy, Interview, 2004). This is understandable. Our objective for having students write a script and act out a vignette was to motivate them to research and understand, in depth, a topic concerning the rebellion. I believe we did succeed with this objective, since a number of students told us how the movie helped them to learn more. But there is a Catch-22 here. When students are concentrating deeply on one aspect of the rebellion, their attention is diverted from other areas. Indeed, one of the things we told the students was that the vignette needed to be about a specific event, since video is best used for capturing a discrete story, and hopefully conveying the feelings of those involved. When we did the exercise that analyzed the CBC Heritage Minutes, I made it a point to emphasize how the videos conveyed the emotional content of the event, using close-ups, music and pace to create the atmosphere of the vignette. However, this emphasis on depth worked against an understanding of the interrelationships between events in the Rebellion.

In order to ensure that students delving into an event in depth came out of the project with a more global understanding of what occurred, I now believe what we needed was a summary activity after the videos were presented that required students to think about everything that happened in the Rebellion. For example, Vicky told me "in the end when you finalized it with the timeline it helped me to finalize my ideas - or where I learned and it helped me and I remember it now" (Vicky, Interview, 2003). One solution that we discussed was a type of Reader's Theatre (Ratliff, 1981; Robertson and Poston-Anderson, 1986) involving the timeline. This idea came about as a result of a discussion with Sara and Marcy about the boredom factor of PowerPoint. They suggested the idea of a whole-class play instead and I suggested the idea of Reader's Theatre using the PowerPoint Timeline. They thought it was a pretty good idea. I thought we could combine this activity with the videos already filmed, so that events in the rebellion not portrayed would just be read out, and the videos portraying events would be played in chronological order throughout the timeline. As part of this culminating activity, a number of questions that focused on the important issues could also be included in the timeline, and, throughout the timeline, the class could stop and attempt to answer these questions. I think this debriefing is an important component of an extended project, and one that we did not focus enough attention on during design and implementation.

I still think that writing a script and producing a video can be motivating - for a teacher who is comfortable with video production, it does have merit. However, for the teacher who is unfamiliar or uncomfortable with video, perhaps a more restricted project could be substituted. Students could pick an event from the timeline, write a short vignette, and maybe even just read the vignette in the context of the timeline, as opposed to learning lines. This could happen in the regular classroom without props or costumes, although they could still be used if students wanted them. A narrator would read the timeline and they would enact these vignettes in chronological order as they occurred. This would still incorporate the use of the consequential task and require students to conduct research to write their vignette, but lessen the overall complexity of the project. The whole thing could be videotaped and played back but the emphasis would shift from making a video to learning about the rebellion. In this form, many classroom teachers might feel comfortable trying the project. It would still have the focus on deep understanding of a historical topic, but would minimize the disruption that occurred because of the need to film in a separate room with backgrounds.

There are many other consequential tasks that could be substituted for the video portion of this project. The ICT objectives for grade 8 specify that students need to learn how to create a multiple-link web page (Objective P5 Outcome 3.1). While not as exciting an activity as producing a video, constructing a web site of student work about the rebellion would also be a public exhibition of their thinking that would allow them to show what they had learned. They would still need to carry out the research, organize their information coherently and present it in a meaningful way.

Positive Experiences as a Designer/Researcher

Being a designer/researcher is a very challenging experience. When I reflect back on the project, a number of things stand out as positive aspects of this experience. These include the good relationships I experienced with my project teachers, Marie and Lisa, the interesting process of conducting interviews with Grade 8 students, and the enjoyment I experienced working with students while we made videos.

Relationships with Teachers

In a project such as this, it is very important that there is a rapport between the designer/researcher and the participating teacher. As identified previously in Chapter 2, there are a number of roles for both designer/researcher and participating partners during design, and these roles are facilitated by a good working relationship between the partners. In this project, I was very fortunate to work with teachers who were bright, articulate and committed to their students. In both instances, I felt very comfortable working with these teachers. There was a feeling of common purpose and camaraderie that made our working relationships an enjoyable experience for me.

Conducting Interviews

Conducting interviews with Grade 8 students can be a nerve-wracking endeavor. If you encounter students who have very little to say, it can be like pulling teeth to find anything out. I remember one interview that was so frustrating, by the end of the interview I had written on my sheet "at this time I was feeling total frustration at getting any info out of this student so I just gave up." However, this was very atypical of my interviews. In both years, most of the students were very eager to give me their impressions of the project and their suggestions for improvement. I asked many of them questions about how they learned best, and, for the most part, they were able to explain what types of activities helped them to learn. It was very intriguing to catch these little glimpses into their thoughts as they explained why one method of learning was better for them than another, or why one activity in the project was superior to the others.

Making Videos with Students

While working with Grade 8 students in the regular classroom setting can be frustrating at times, working on the videos was an electrifying experience. Students were excited to be involved in creating videos and you could feel that excitement throughout the process. Putting on make-up and costumes, designing a background for their video, making decisions about staging and the inevitable bloopers all contributed to their enjoyment of the activity. There were many incidences of laughter and the high-spiritedness that you often see with younger students in a non-traditional school activity. One group trudged through very deep snow on a bright March day recreating the soldier's march to Batoche. Their struggles to get through the snow and pitch a tent were quite humorous. Another group rode on stick horses as they recreated the Metis ride to bring Riel back to Saskatchewan. Occasionally, they would all dissolve into gales of laughter. I remember one morning, as we were taping a serious scene of Middleton writing a letter to Sir John A. Macdonald, a muffled expletive emerged from the back closet from a student trying to get his costume on. The whole group, including our budding actor, burst out laughing. Another student, who was supposed to be jumping out from behind a bush to rescue Elizabeth MacLean from her captors, pretended to be doing it in slow motion. Everyone laughed. The time flew by, as it does when you are doing something enjoyable.

Further Reflections

I was examining a project found in the illustrative examples for the ICT curriculum. Task SS08 asks students to choose an important event or individual in Canadian history from the 20th century that significantly contributed to our country's development, research this significant event or person, using textbooks and other relevant print sources, related CD-ROMs, and/or the Internet, and, using a multimedia format (e.g., slide show, multimedia software, HyperStudio, video or audio presentation), present the information to their class or to another class. This project is essentially the one we carried out in Marie's class the first year. Compared to our project, it puts even more of the onus on the student to find resources themselves and still requires the consequential task of designing a multimedia presentation. Not only does this project require the teacher to be comfortable in an inquiry environment where students are engaged directing their own research, it also requires access to a wide variety of resources, and requires the students to be familiar with a number of technologies – either PowerPoint, HyperStudio, digital video and audio editing and the ability to put it all together into a presentation. If you look at the technological and inquiry related skills involved in SS08, this project would be even more complex to implement than the one Lisa and I worked on. Our project was less demanding in that we used only two technologies (video and online communications and resources via NiceNet) and looked at only one event (the North West Rebellion) with a collection of resources that was extensive and easily accessible for students to examine.

A project such as SS08 would be very difficult to manage in a rural school with a slow Internet connection and limited library resources and would require very technologically literate teachers and students. It worked fairly well in Marie's classroom for a number of reasons. First, her computer resources were phenomenal. To have a classroom set of portable computers that would work wirelessly throughout the school is, in my opinion, a teacher's dream come true. On those computers, students had access to all of the productivity software needed to produce video and multimedia. Second, her personal knowledge of technology was extensive and it was obvious that she had worked diligently to ensure that her students were comfortable with computer technology as well. Third, her class was well versed in the processes of inquiry so she was comfortable assigning a project of this complexity. She also trusted her students to work responsibly whether they were in the classroom or working throughout the school. Fourth, she was familiar and comfortable with the management style needed for this kind of a project.

Contrast the description of Marie's setting with Lisa's school environment. Internet access was very slow – almost unusable at times and plagued by network problems and non-existent software for parts of the project. While she worked at incorporating ICT outcomes into her classroom operation, the extent of Lisa's knowledge about various computer applications was less advanced than Marie's. This meant that she was less comfortable in a computer environment than Marie was. Third, her class was accustomed to a more traditional mode of operation. When presented with the opportunity for group and independent work, many students would choose to play computer games, visit with their friends or cause disruptions. Lastly, Lisa was noticeably less comfortable with this type of classroom structure. Nonetheless, she supported the project through two iterations and worked diligently to ensure a successful experience for all the students involved.

In this province, we have a mandated curriculum and numerous activities based on inquiry and constructivist classroom operation, but the teachers are left to muddle their way towards these ideals. In many instances, those teachers are working outside their area of expertise. What types of support need to be put in place? I have a number of suggestions. It would be useful to employ subject level consultants who would make suggestions for change, model new teacher behaviors, and arrange visits to inquiry-oriented classrooms so that teachers can view these new methods of classroom organization. Subject level teacher groups could be organized to provide that discussion that is so necessary for a teacher wanting to make a change. Infrastructure improvements such as SuperNet or satellite access to ensure high speed access to the Internet may allow teachers and students access to a wealth of resources now denied by the low bandwidth.

It's easy to blame the system. We all do it. In this instance, there are inequities within the division that have an impact on what can be accomplished. But another important factor concerns the desire of the individual teacher to make that change. And that is probably the most difficult area for change to occur. If a teacher feels they are facilitating learning with their current teaching strategies, why would they even want to change?

Judith Shulman states:

> Transforming traditional practices to something as radically different as constructivist methods demands more than individual collaborations. It requires incentives - a compelling reason to change, such as the belief that students are not learning with current methods. It needs encouraging contexts and opportunities for teachers to participate in teacher learning communities that promote reflection and sustained inquiry. It needs access to concrete and observable models of

> teachers engaging in the new practices and/or opportunities to see instances of teachers' excitement as they tinker with new approaches. (Shulman, 2004, p. 405)

It may transpire that we will not be able to see this type of change occurring until teachers can relinquish the idea that content acquisition is the most important facet of education or that every student needs to learn the same standard set of facts. And of course, this is reinforced by compulsory exams occurring every three years that test content knowledge. In the first draft of this chapter, I had included the following quote from Lisa:

> This is my fourth year and I'm starting to feel like I know some of that stuff now, but even still, before I teach this stuff, I'm back to that textbook reading those chapters before I introduce them to the kids because I don't remember that stuff from last year. (Lisa, Interview, April 27, 2004)

When he read this passage, my peer reviewer wrote back with the following comment:

> the other thing that seems to be happening is that the teacher is still holding on to notions of authority, authoritative knowledge, etc, and not fully committing to the social constructivist notion of knowledge. She seems to hold to the idea that there is one (or a few) truth(s) about the Riel Rebellion and that she should know them and that the kids should end up with them at the conclusion of the course. You can hear this in her fears and discomfort. If she had a post-modern sense of knowledge and reality, she would say things like, "I wonder what kind of Riel Rebellion it will be this year?" "I wonder what the Riel Rebellion will be for this student?" "I wonder how the Rebellion will change when it is constructed through video activities instead of textbook reading?" Remember this is not one Riel Rebellion fixed in time. There are countless Riel Rebellions. It is not even correct to think that there is, for instance, a "Metis version of the Rebellion" because each Metis will construct their own version. (L. Rourke, personal communication, June 2006)

This really caused an impact on me as I considered his viewpoint. I realized that deep down, I probably had the same mindset as Lisa. I wanted to see evidence that all the students had learned a great amount of content about the Rebellion. I was expecting to have students tell me all about the causes of the rebellion, showing evidence that they had absorbed much more than if they had just read the textbook. Of course, they **had** learned things in depth, but that deep understanding was about the battle of Fish Creek, or the massacre at Frog Lake. We still needed that culminating activity that I discussed earlier if we were to tie together all the disparate information students had acquired.

In my heart, I was afraid that we had done all that extra work for nothing. I had designed this constructivist environment and it had not worked to bring about enormous strides in learning. I was disheartened by the outcome of this project until I realized that my expectations were so high that I was bound to be disappointed. I had read so many articles recounting how constructivist environments could result in increased student learning that I had built up an unrealistic picture in my mind of what would transpire in my project. I expected that the successful project from Marie's classroom would transfer to Lisa's classroom simply because the resources and activities designed would be enough to carry it. I did not consider the behind-the-scenes work previously carried out in Marie's classroom - the work on student interdependence, the trust relationship that was fostered, little steps in independent learning and original thought that were painstakingly rewarded - that added to that success. It is interesting that I was the only one disappointed with the project. Lisa told me she thought it was a good project, and the students liked it a lot - they kept telling me how much fun it was and how they wanted it to go on longer.

I didn't put as much stock in the things students did learn from the project - things like learning about video, things like conducting research on their own, collaborating to write a script, using a timeline, reading primary materials, accessing a database of web materials, using an online communication program - as I valued the content they acquired as a result. But when I looked carefully at what the students said, I found evidence that there was a deeper learning going on. For example, Nick told me: "I learned a lot more than what we read in a book, because the book had half a chapter on it but it doesn't explain, it didn't get to what we did" (Nick, Interview, 2003). When Zach talked about the primary sources in the website he said, "it made me understand the unit more and helped me understand what we were doing in the movie . . . it helped me understand more than just doing bookwork (Zach, Interview, 2003). Other students remarked on the project as a way of showing different perspectives as when Nathan said, "reading's good but it's always nice to get some hands on experience, like . . . doing a movie because it does show the point of view" (Nathan, Interview, 2003). Students also commented the skills they learned in the project. Emma told me:

> we did learn stuff and we discovered skills – or we learned new skills that we didn't really know about before like editing and stuff in the movies. Our acting skills, we learned those and we also learned to laugh at ourselves, and laugh at others – with them though. And we learned from our mistakes. (Emma, Interview, 2003)

We definitely met one of our objectives for this project - students did perceive the project as fun and memorable. When I consider this evidence, I see that there are more facets to what was learned than what I see when I just examine what students recalled.

What I have been talking about above are my perceptions of student learning. When I designed my developmental research project, I did not build in formal summative assessment of student learning. My evaluation activities were always meant to be formative evaluation of the project from a qualitative perspective. The teacher designed all student assessment activities. While I did assist by providing a rubric for the video portion used by Marie in her project, the teacher carried out all the assessment by herself and handed them back to the students. I never saw the results of those assessments. In retrospect, I should have obtained copies of those assessments so that I could gain a more complete understanding of student accomplishments. My perceptions of student learning were based on my observations during the project, the scripts and videos produced, and those statements from the second year interviews where students talked about what they had learned. It is quite possible that students learned a lot more than I perceived that they did. It could be that explaining orally what you have learned puts students on a spot, where if they had had the time to reflect on the question, they may have been able to answer more extensively. It is also possible that the type of longer term learning mentioned by Lehrer (1993) in chapter 2 would also be an outcome of this project.

When I look back at our original goals for the project, there are other successes as well. In the videos, I could see evidence that students were identifying with their group and showing an understanding that there were multiple perspectives at play in the rebellion. They improved their technology skills in a number of areas, they worked collaboratively (for the most part), and they developed skills in analysis and synthesis through the treatment and scriptwriting exercises. When I look at the project from those perspectives, it **was** a worthwhile project.

I did not want to use an experimental design where the emphasis was placed on student outcomes. My dissertation was conceived as an examination of the process of developmental research in an actual classroom. As I have mentioned before, my wish was to work within a constructivist classroom. However, being involved in a similar project in both a traditional and a constructivist setting does offer contrasts that have been useful to explore.

In the preceding sections, I have tried to critically examine my project and make some recommendations for improvement. I have also tried to recommend some support structures that might be useful in helping teachers work towards a more inquiry-oriented classroom. In the next section, I will address the following research question: *What can be said about the design model used during the developmental research process?*

The R2D2 Model

The choice of an instructional design model for use during this project was very much influenced by Lijnse's definition of developmental research as a "cyclical process of theoretical reflection, conceptual analysis, small-scale curriculum development, and classroom research of the interaction of teaching-learning processes" (1995, p. 192). It seemed to me that to commit to this understanding of the research process required that the steps in instructional design also follow this philosophical stance. The Reflective, Recursive Design and Development model (R2D2) (Willis & Wright, 2000) seemed a logical choice. Because its process of reflection, recursion and development, as well as its emphasis on participation, seemed to match the cyclical nature of developmental research so well, I chose to follow this model in my design efforts.

In chapter 2, I included quotes from Colón et al. (2000) that profiled the elements of the R2D2 model as recursion, reflection, non-linearity, and participatory design. The recursive or iterative element of the model means that design decisions are often revisited throughout the design process. Whereas in traditional instructional design, elements such as problem definition, outcomes, and goals are often defined quite firmly right at the beginning of design, the R2D2 model allows for these elements to emerge throughout the design process as a result of consultation with the learning partners. The design is encouraged to be reflective, incorporating new ideas contributed by others and acting on feedback throughout the design process. The designer is also encouraged to assemble a team composed of stakeholders (students, teachers, parents) as well as other creative professionals in order to work cooperatively towards problem solutions and to develop contextual understanding (phronesis) of the learning environment. The designer is encouraged to be flexible and incorporate changes as they arise during the development of the resource.

As you can see by this explanation, the cyclical nature of developmental research dovetails nicely with this type of design. Consultation and co-design work with peer mentors, practicing teachers and students are built into the design from its inception. While the initial theoretical precepts of constructivism influence the general design of the project, goals are fluid and are defined and redefined throughout the project. Input from the participating teachers as well as the students affect future iterations of the project and impact design decisions throughout.

The explanation above is the theoretical ideal, the process I had in my head as I designed and worked through this project. The reality was somewhat different. Many of the decisions that were made in the project reflected expediency rather than reflection. For example, during both iterations in Lisa's classroom, we dropped the interview assignment due to time pressure. Finding a balance between constructivist ideals and the rough and tumble of a real classroom did lead to tradeoffs during the project.

I believe that the R2D2 model was consonant with my style of instructional design. Since I had adopted a constructivist research methodology (Lincoln & Guba, 1994), the aspects of reflection and participatory consultation were important components of any design that I would carry out, and the recursive aspect of the model ensured that I could be responsive to any comments and suggestions forthcoming by my research partners. Although I had originally conceived of the project as a revisiting of the recent retrial of Louis Riel with students taking part in a role-play of the trial, as a result of suggestions from both my participating teacher and others, I changed the project in an attempt to make it more authentic by having students act as investigative reporters. The original student assignment presented to Lisa in November of 2002 had the students writing position papers about their group's perspective but as a result of our planning meeting in January, we decided to substitute the interview assignment instead. These are just two examples of changes made to the project arising from its participatory nature.

Other changes came about as a result of the environment. Since bandwidth was an issue in that school, many of the web-based resources were incorporated directly into the Rebellion website located on the local network server in order that these resources could be quickly accessed. As well, the website was very open-ended - extra components could easily be added to it if they were needed. The flexible nature of the website also meant that students had many choices when choosing what they wanted to research.

While I am happy with this model of instructional design at a philosophical level, there is a downside to its use as well. By virtue of its flexibility and iterative nature, it may also be more time consuming. Where traditional instructional design would produce a fairly static design that would be unchanged throughout implementation, this type of design could allow the possibility for constant tinkering throughout the trial period. This would not cause any difficulty if design is one's sole responsibility, but for someone who is also attempting to conduct research at the same time this might present a problem. You are attempting to carry out two or more different roles at the same time with the subsequent lessening of attention for any role.

The second aspect of this model that could potentially cause difficulties concerns its emphasis on collaboration. Though I never experienced a problem working with either Marie or Lisa, it is possible that a developmental researcher involved in a collaborative partnership where differing views caused conflict could experience real difficulties during the design process.

Willis and Wright (2000) conclude that " the model we decide to use and the models we accept as appropriate for others to use are based on our beliefs, our experiences, and our perspectives about what design is" (p. 16-17). Philosophically, I believe in the importance of shared vision and stakeholder participation in the design process and for those reasons I chose the R2D2 model for use in my developmental research design. However, any designer considering this model should also reflect carefully about those aspects of the model such as conflict with stakeholders or the potential for overload arising from the iterative nature of the model before choosing to use it in their own projects.

I would now like to turn my attention to an examination of the developmental research process itself by examining the research question: *What can be said about* *developmental research as a process for design, development and implementation in the classroom?*

Thoughts on Developmental Research

Lijnse (1995) points out that the aim of developmental research "is a detailed description, justification and understanding of content-specific teaching and learning activities and processes. . . . It is not aimed at building "grand theories" . . . but at understanding and developing "good teaching practice" (p. 197). It asks for a "gradual and continuous process of dissemination, use, reflection, and further development of ideas, in order to establish change at all levels" (p. 197).

Gravemeijer (1994) tells us that the developmental researcher starts with a series of beliefs, a "core theory" that is "embedded in a framework of theories or theoretical notions on learning, instruction and instructional design. It is this set of theoretical notions that guides the developmental work" (p. 448). He further explains:

> In curriculum development the focus is on the instructional activities that embody the educational change; the emphasis is on the product, not on the learning process of the developer. On the whole, the knowledge that is gained will remain implicit, tacit knowledge. In developmental research, knowledge gain is the main concern. The focus is on building theory, explicating implicit theories. (p. 450)

These theories are fine grained, based on the alternation of thought experiment and practical experiment. "Such a learning process can be interpreted as theory development; each course can be seen as the concrete sediments of a local instruction theory" (Gravemeijer, 1994, p. 450). Developmental research is a "goal-oriented process of improvement and adjustment" (p. 451).

As I think about these statements, I find it difficult to explain what advancements have occurred to my local instructional theory as a result of this project. I started with a project based on a theoretical notion about learning and instruction and attempted to design a project that embodied that theoretical notion. Along the way I learned that the myriad of factors that interact in a normal classroom are exceedingly hard to keep track of, and that splitting your focus between design, instruction and research makes it even more difficult. However, I do have some insights I have to share as a result of this project.

The Importance of Classroom Environment

In chapters 4, 5, and 6, I discussed the differences between Marie's classroom and Lisa's classroom in terms of organization and resources. It is very evident to me that context is an important consideration when conducting research. Working in two separate classrooms provided me with comparisons and allowed me to see how teacher philosophy and classroom organization can impact the design and implementation of an instructional intervention. As I compared the classrooms and highlighted their differences, I tried to identify certain factors that would be needed when moving from a traditional to a constructivist classroom as I made my recommendations for change.

Length of Time between Iterations

In the university setting where a class may be taught a number of times throughout the year, the opportunities for observation are much increased. In the case of a school setting, a curriculum topic is often only addressed once a year. This causes a lot of pressure because you have to have everything ready for that one time. It is quite stressful for the researcher because of the need to capture everything in such a short period of time. Then, if you have made any changes, you have to wait a whole year before you can see the effect those changes may have. In the interim, it is easy to forget the minute details of what happened the preceding iteration and thus forget about changes in organization or action that you had originally thought to make. Even with the most detailed research notes (and mine were far from that since I was often engaged as an instructor) there are nuances that, if iterations were closer together, might still be remembered and acted upon.

Avoiding Role Overload

Researchers should be very careful to ensure that they do not take on too many roles at once. In my instance, I was over-confident in my ability to juggle the roles involved with being both a designer and researcher; and I had never envisioned being the instructor at all. Role overload is a very real danger in developmental research and those attempting it need to be cognizant of the fact. I have several recommendations for handling this problem.

First, don't volunteer to help with technology. At my candidacy oral, one of my committee members suggested that volunteering my help with ICT integration would aid in my search for a participating teacher. She was right. It did help me to find a teacher to work with, but from then on, I was perceived more as a computer expert than as a researcher and was called upon accordingly. I think it is really important that your focus during the actual implementation of your project is centered upon conducting the research.

Second, try to ensure that the design period and the implementation period overlap as little as possible. While this may mean that you take away somewhat from the iterative nature of constructivist design, having to design and conduct research at the same time splits your focus and takes time away from research activities such as observation, writing research notes and reflecting upon what has occurred. I feel that the research activities were often shortchanged amidst the other activities, especially those involving participation in the classroom.

Evaluating Developmental Research

Another perplexing element of a developmental research project is a result of what my friend called the "moving target" of classroom research. Ann Brown states it very eloquently:

> Consider the design experiment that my research team is currently trying to engineer in the classroom. This includes effecting basic change in the role of students and teachers, modifying assessment, introducing a novel curriculum, establishing a technologically rich environment, setting up cooperative learning situations, establishing a classroom ethos where individual responsibility and group collaboration are the norm… This reflects the major problem of trying to conduct design experiments consisting of many interwoven aspects. Components are rarely isolatable; the whole really is more than the sum of its parts. The learning effects are not even simple interactions, but highly interdependent outcomes of a complex social and cognitive intervention. (Brown, 1992, p. 166)

If an experienced cognitive scientist such as Ms. Brown found it challenging to conduct design experiments in these conditions, then think how mind-boggling it was for us. There are so many elements involved in this type of research. Not only does the project morph from iteration to iteration, but the students change as well. So many things are changing that it is very difficult to decide whether it was something in the project that made a difference, or whether it was attributable to the different students who participated.

For example, let us examine student differences. In year one, the students were highly motivated. They liked the idea of being an investigative reporter, worked very hard to find information, and regularly posted their results in NiceNet. Some of the students from this class did extra reading and Internet searching at home to find out more information about the Rebellion. The teacher told me these students were "the best group of kids I have ever taught in all my years of teaching and you know, they were like the class from heaven" (Lisa, Interview, April 27, 2004). The comparison between the first year's class and the second year's class was dramatic. Here is our discussion from the final interview:

> Lisa: from the very first week of school, when I had even brought this up, that we were going to be doing this project and we were going to be making movies and that kind of thing, right from the get-go, there just wasn't that "oh, wow, that's really cool, we get to do this" it was "okay, whatever". Right from the beginning, before they knew what it was going to be about, or anything. It just didn't have that enthusiasm part. As far as the why, I have no idea.
>
> Bonnie: Do you think that the idea of doing the research was intimidating to them?
>
> Lisa: Maybe to some of them. There are a lot of weak students in this grade 8 group – a lot. And last year - the way things were set up in our school last year, most of the students who were weak were in J's class in the split 7/8.
>
> Bonnie: Why?
>
> Lisa: Because they thought that those kids would do better if they had homeroom and it would help with their organization without having to move from class to class and have all these different teachers and all that. So those grade 8's we had last year, there were next to no weak kids in that class, as far as the whole grade 8 group in our school. But this year, that's not the case.
>
> Bonnie: All the weak ones were in the big one?
>
> Lisa: They were, yeah. But even looking at that, those kids in the split class who were almost all high end kids, with the exception of a couple, there still wasn't that much enthusiasm. [I know] And they still didn't want to do the research. They didn't. They didn't want to read about it, they didn't want to find out, they weren't interested in it. (Lisa, Interview, April 8, 2003)

Another example: NiceNet usage. Year one students used NiceNet regularly. Year two students rarely logged in. Is this attributable to their level of enthusiasm, or to the fact that they only did their research once a week and wanted their fellow group members to have access to what they had found? Or to the fact that they had time in between sessions to post their summaries but in year two the students conducted all their research in a contiguous block and did not have enough time at the end of every period to post their findings. Or that in year two, all the information that was scattered in different places the first year was assembled into a website and students could just show their partners what they had found.

As Shambaugh and Magliaro (2001) point out "Each school year or course delivery provides a unique set of learners and learning characteristics that must be analyzed in developmental research as a unique case" (p. 305). I certainly learned this when working with these two classes. The classes were so very different in terms of their enthusiasm and the amount of independent work they accomplished. As Lisa pointed out, you could not really attribute it to intelligence either, since the 7/8 split students were all higher functioning, but still manifested the same lack of enthusiasm.

There were many factors that changed between the two iterations. Not only did student attitudes change, but there was also the extra stress of working with two different classes at the same time in year two. In retrospect, I should have worked with the 7/8 class first as a kind of pilot and then taken only a researcher role with the full group. I could have worked some of the bugs out with the first group and concentrated more fully on observations with the second group. This would not have been a problem since, because of the need to use a special room for video, the project was not in historical sequence anyway. Another changed factor from year two was related to scheduling. In the first year, the research component of the project occurred once a week. In the second year, we worked through all the research activities continuously. On the one hand, having time between sessions allowed extra time for research and communication. On the other hand, some students told me that it was harder to remember things in this format. In the second year, all the research activities were together, so it was easier to remember what happened. On the other hand, there was less time to conduct research and less opportunity to access resources such as the website database. Changes like these make it very difficult to formulate conclusions about the efficacy of the project.

The Importance of Critical Peers

Another thing I learned as a result of this kind of research is the important role occupied by thoughtful and analytical friends throughout this process. Time and again, I have received invaluable insights as a result of questions and comments from my advisor and my peers. These questions have led me to examine my results in a number of different ways. I had not thought to ask students what they had learned as a result of the project until my advisor suggested it. I had focused in my interviews to a large extent on aspects of the project, how students perceived they learned best, and changes for other iterations that I had not considered that question.

In this section, I have tried to identify some insights that have occurred to me as I reflect on the process of developmental research. As you may have noticed, I do not have any grand conclusions, just some thoughts and puzzlements along the way. I still believe that developmental research has a role to play in classroom revitalization and I have tried to identify some factors that might help the change to a more inquiry-oriented and student-centered mode of operation.

Thoughts on Fostering Constructivist Learning in Social Studies

Several years ago, I was involved in an action research project. The school division in question was actively involved in supporting constructivist learning by using money allocated by the government for innovative projects to provide both release time for teachers and technology support. This division had dealt with the issue of timetabling and curriculum constraints mentioned in Chapter 7 by initiating a locally developed curriculum termed Humanities that integrated Language Arts and Social Studies. Constructivist philosophy underpinned this curriculum and the longer time periods that resulted from this combination gave students more time to carry out research. This curriculum also incorporated student reflection about the learning process as an essential skill. In my role as university researcher and critical friend, I assembled resources for the teachers to support their action research projects, observed in their classrooms and shared my observations of what I saw occurring in order to support the teachers' classroom-based inquiry.

In one school in particular, Pineview (a pseudonym), I saw the results when a school is organized to support constructivist learning and has the active support of the principal, the parents and the teachers. This school was similar to Lisa's school, in that it was also a rural school in a rural school division located close to a large city with a similar mix of farms and acreages supplying students to the school.

Technology was pervasive in this school and was used extensively in the classes. There was a computer lab, pods of computers situated outside of classroom doors and computers within each classroom. Teachers had access to the internet from within their classrooms and data projectors to project this information to the class. There was also a media room with equipment for video and audio.

In one classroom, I watched as a Grade 8 teacher projected a curriculum topic on a screen at the front. He then initiated a discussion with the students as to how the class would go about meeting the objectives listed in the topic. Rather than the teacher assigning readings or topics, the students were determining what they would learn. In another classroom, the teacher completed every class by having the students write reflective journals. In these journals, students discussed what they had learned that day, as well as examining what strategies helped them learn best. That day also happened to coincide with a science exhibit that was set up in the common area outside the classrooms. For the whole morning, classes within the school were invited to come and talk to student groups who had researched different habitats and designed ecologies. These exhibits included maps and models of their ecology; flora and fauna invented by the students that would thrive in that ecology; and examples of commercial products that would support the economy of that ecology. As we moved from table to table, students would tell us what motivated their design decisions and show us the various artifacts they had constructed.

I include this anecdote as an example of what is possible when change is actively supported within the educational hierarchy. With the changes in curriculum at the division level, with the support of school administration for flexible scheduling, and with the active fostering of constructivist philosophy within the whole school, it is possible to foster the kind of change we tried to initiate in Lisa's classroom. I have to say that this school comes closest to what I would consider an ideal environment for learning; add to that Marie's class set of mobile computers and it would have been very close to perfect.

Systemic Change

Recently I was asked what I thought should be happening to support teachers in moving towards a classroom that fosters constructivism. I have addressed this question somewhat throughout this chapter, but now I would like to reiterate those suggestions in a more comprehensive way. Moving from a traditional classroom to one that supports constructivist ideas involves support at a number of levels. While there are examples of teachers who are able to make this switch on their own (e.g. Marie), I think the majority of teachers need a number of supports in place from all levels.

Before I talk about these supports, I would like to present a scenario about what I think an ideal constructivist classroom would resemble. This scenario is based on classrooms I have seen, as well as my own thoughts based on a number of articles describing other projects. First, I agree with Marie that this classroom would foster trust and risk-taking. Students would not be afraid to ask questions or answer them for fear of being labeled dumb. Students would treat each other with respect and recognize the fact that different people bring different perspectives on many issues to the classroom.

In many classrooms, teachers ask questions when they already know the answer. In life, when you ask a question, it is because you want to find out something. In an inquiry classroom, discussions would not resemble traditional discussions where teachers ask the questions and students provide the "right" answers but would be more akin to classroom debate, with both teacher and students asking questions that require deep thought, discussion, and problem-solving. There would be unstructured times to allow for silent reflection but the majority of time would be organized around a search for answers to questions and problems generated by the students. Reflection would be an important component of this classroom, with opportunities for students to explicitly think about their learning in a number of ways including debriefing, reflective journals and evaluative activities.

The classroom would be a very social place, bustling with interaction, from dyads or small groups to full class discussions. As an outsider, if I walked into the room I would be impressed with the level of intensity. Students would be engaged in numerous activities while the teacher would be equally engaged, helping students formulate questions or search strategies, sometimes mediating disputes in groups, sometimes calling the class together for short just-in-time lessons on topics she has noticed are causing difficulties for all. Marie told me the teacher would be constantly assessing where students were and trying to cement their learning or refocus them if they having difficulties, but most of all trying to get them to stretch themselves and their understandings.

Ideally the classroom would have ready access to technology, either through mobile wireless laptops or other portable devices such as wireless handheld computers the size of game consoles (Pea & Maldonado, 2006). The classroom would have a rich variety of both print and non-print resources and would include resources such as primary documents, pictures or paintings, music and art.

Evaluation in this classroom would be seamlessly incorporated into the activity of the classroom and would assess both product and process. Artifacts produced by students would be assessed on a number of dimensions and would include assessment of the research process, the product itself and would be judged by both student and teacher criteria. Part of the evaluation process would include periodic formative evaluations to support improvement as the project progressed.

The teacher's role in this environment is one of peace-maker, relationship coach, cheerleader, resource provider, critical friend, mentor and role model, the person who scaffolds learning for students who need a little support and the person who challenges students to think further about an idea or examine it from different perspectives than they would on their own.

Marie told me once that you can tell a constructivist classroom by looking at who is doing the work and growing the most dendrites. If the teacher is structuring the environment by choosing the questions and problems, providing the resources and defining the right answers, then he/she is the one growing the most dendrites. Students need to be in charge of their own learning, defining the problems and questions to study, deciding how to find the answers and constructing their own knowledge by synthesizing the information they have found into some type of culminating artifact.

This leads me to consider what types of support need to be in place to scaffold this type of classroom. Several aspects that I think are important include teacher support, resource support, assessment aligned with classroom philosophy, and parental/student support.

Teacher Support

As I think about teacher support, a number of issues occur to me around this topic. How do we convince teachers that it is worthwhile to change their classroom teaching practices to embrace constructivism? How do teachers come to a deep understanding of constructivism and how it is manifested in their classroom? What needs to be done to support teachers working outside their area of specialization?

Michael Fullan, an author who has written extensively on curriculum change in schools, tells us that changing curricula usually involves three aspects: "the possible use of new or revised *materials* (instructional resources such as curriculum materials or technologies); the possible use of new *teaching approaches* (i.e., new teaching strategies or activities); and the possible alteration of *beliefs* (e.g. pedagogical assumptions and theories underlying particular new policies or programs)" (Fullan, 2001, p. 39, italics in original). He also states that, of the three aspects, changing beliefs proves most difficult. As Shulman stated: "Transforming traditional practices to something as radically different as constructivist methods . . . requires incentives - a compelling reason to change" (Shulman, 2004, p. 405).

It seems to me that one of the most compelling ways to convince teachers that changing practice will result in a better learning experience for their students is to demonstrate constructivism in practice. There are several ways for this to occur. We can give teachers the chance to visit classrooms and see what a constructivist classroom environment is like. I have already recounted what a revelation it was for me to talk with students and teachers at Pineview school as well as in Marie's classroom. For teachers who are unable to have this first-hand experience, perhaps we can put scaffolds in place such as Barab's online Inquiry Learning Forum (ILF), designed to "support teachers with diverse experience and expertise coming together in a virtual space to observe, discuss, and reflect on pedagogical theory and practice anchored to actual teaching vignettes"

(Barab, MaKinster, Moore, Cunningham, & the ILF Design Team, 2001, p. 72-3). ILF teachers virtually visit other classrooms and then discuss the pedagogical aspects of those classrooms. I think that many practicing teachers, especially older ones, have never had the opportunity to see constructivism in action and would might be surprised at the changes, especially in student skills and agency that they may observe.

But seeing an example is only the first step. Like Shulman (2004), I believe that teachers need to "participate in teacher learning communities that promote reflection and sustained inquiry" (Shulman, 2004, p. 405). When I worked with Marie, I was able to see firsthand how the activities and discussion in a teacher learning community could affect change. The innovative social studies project I alluded to earlier had helped teachers in her division integrate technology into their social studies teaching practice. The model was one of collegial discussion and participation. It gathered together a number of teachers from the same subject area and afforded them the opportunity to work together, try out new activities supported by their peers and discuss how these activities would be integrated into their classroom.

My perception was that this innovative project was very effective at accomplishing its goal of integrating technology into social studies. However, the project was not an on-going feature of the division – it was funded through special grants. I think that a project like this needs to be an integral part of teaching and should be supported by ongoing funding within the division and part of department policy for the province. I can see a role for Alberta Education to develop a central repository much like the ILF to provide the exemplars from constructivist classrooms for teachers to view. However, as studies in learning communities have shown (Barab, et al., 2001; Rourke, 2005), it is necessary to keep the groups small enough to facilitate discussion amongst the participants. I thought the face-to-face interaction of Marie's group was very effective and the ideal venue, but it could always be bolstered by other online types of activities ranging from small subject group activities inside spaces like NiceNet or WebCT, to online voice discussions in Elluminate, to full video experiences using desktop videoconferencing. Regardless of how it is implemented, the important element here is the sustained dialogue needed to deepen understanding and support change in practice.

Based on my experience in Lisa's classroom, one of the discussions that must occur in the learning community forum I discussed above concerns how to handle the complexity of a constructivist classroom. I think a teacher must have concrete suggestions on how to foster this type of classroom, otherwise this type of classroom can soon feel so chaotic that a teacher will often fall back upon more traditional forms of instruction. Teachers must value this complexity as it indicates that students are working independently towards their own knowledge and skill objectives; a discussion with experienced colleagues can help teachers understand why this complexity, although challenging to manage, is so important in the development of students as self-directed learners. A second related topic needing to be discussed concerns time. Teachers need to understand that learning for depth takes time, and those activities that are sometimes regarded as frills in student textbooks are actually very important for developing the skills of independent thought and problem-solving we value in constructivist environments.

Another effective way to support teachers wishing to change their practice involves finding constructivist teachers to act as mentors. Having a teacher such as Marie available to introduce me to constructivism in the classroom was invaluable to me. I just wish she had been available to help Lisa and me during our project. I would like to see some mechanism whereby these teachers are identified and made available as resources for others. The Alberta Teacher's Association maintains a database of presenters for inservice sessions, and this might be a model for identifying mentors as well. However, there will costs associated with mentoring that will need to be factored into any kind of mechanism developed to share their expertise.

For teachers who are not teaching in their area of expertise we need to add yet another level of complexity. In addition to the resources for support mentioned above, these teachers would also need extra resources to support their acquisition of missing subject area knowledge. While it is easy to provide content resources since they could be available either online or in the form of supplementary readings, the real problem lies in another direction – how do we persuade teachers that it is important to become experts in a content area? And how will these teachers be introduced to the kinds of teaching activities that help students understand the subject matter (e.g. Shulman's pedagogical content knowledge)? As I learned from my project, classroom teachers are incredibly busy people who also have lives outside of school and interests that do not always coincide with their subject assignment. We need to focus attention on how we can encourage these teachers to put in the extra work involved in becoming an expert teacher in a subject area. If I can use Marie and Lisa as examples, there were many days when they were at school from 7 in the morning until 5 at night, then still faced further preparation and marking duties after supper because they were involved with extra-curricular activities and supervision throughout the day. Now add in family obligations to that schedule and it would leave very little time for any other learning endeavors. It seems to me that there needs to be some kind of incentive to encourage teachers to work towards expertise. I do not have many suggestions concerning this dilemma, but two that come to mind are release time set aside for this purpose (to acquire content knowledge) and mentorship by expert teachers to introduce these teachers to the abovementioned subject-specific teaching activities. Monetary rewards or credits might also be feasible, but I suspect that might cause difficulties with bargaining or possibly even with provisions in the Education Act. Another possible way of addressing the problem of teachers working outside their subject area would be to incorporate special provisions during implementation of any new curricula. These special provisions could provide the extra content resources needed and devise a system whereby expert teachers from that subject area could be paired with teachers who are working outside their area of expertise.

Resource Support

The second support for fostering constructivist learning in the social studies which is vitally needed involves the rich environment of cognitive tools needed for student inquiry. Books, maps, computer resources, and primary documents are the aids needed to support students in their research endeavors. I have always felt that this was a problem in inquiry-based curricula such as social studies. There never seems to be enough resources and if you are relying on online resources, this can be a problem too, as we found in our project. If you recall, our problems centered around slow internet access and computers that sometimes crashed for no reason. Lately, I contacted Lisa to see if her technology problems had been solved with the advent of SuperNet in her school. She told me that SuperNet made a huge difference but, due to overcrowding, they had lost the free use of the computer lab that they had been used to. When I was there, they had two computer labs for the school and access was not a problem. Now they only have one lab and it is used as a classroom for two and one half days out of the week. It is ironic that, now that they have a fast connection to access resources, they have very little access to it.

What is the best way to provide resources for these curricula? Paper-based resources are very expensive. For example, the student texts for the new social studies curriculum in Grade 7 (which is where the Canadian history section has been moved) average seventy dollars. Using online resources can supplement these text-based resources but have their own difficulties (lack of access, unreliable technology), making teachers reluctant to rely on this means of accessing resources. Changing to a student-based inquiry-oriented kind of classroom requires readily available resources. Since this issue is one that is out of the teacher's control, lack of resources can be a barrier to the establishment of a constructivist classroom.

I favor moving to the $100 laptop concept championed by Negroponte (1995). He suggests that we need to rethink how we provide resources to students. This idea has already produced a wonderful little wireless laptop that is being developed to be used in many impoverished countries in the world to provide all kinds of resources including online textbooks (see it at http://www.laptop.org/laptop/hardware/specs.shtml). Another way to provide a wide variety of resources for students involves class sets of handheld computers.

Congruent Assessment

I really feel strongly that the type of evaluation must be congruent with the organization of the classroom. High stakes testing that emphasizes the acquisition of facts and is used as a measure of teacher accountability sends the wrong message to teachers about what is important. This type of testing is an artifact of the instructivist classroom (Sawyer, 2006). In the book *How People Learn*, a summary of learning commissioned by the National Research Council in the United States, assessment in a student centered classroom needs to be formative, making students' thought visible and allowing teachers to "grasp the students' preconceptions, understand where the students are in the "developmental corridor" from informal to formal thinking and design instruction according" (Bransford et al., 2000, p. 24). They go on to say that assessment should "provide students with "opportunities to revise and improve their thinking, help students see their own progress over the course of weeks or months, and help teachers identify problems that need to be remedied" (p. 25). This type of assessment is a far cry from the Friday quiz or the department mandated multiple choice test of factual knowledge. I searched the Alberta Education website looking for information about evaluation. The website has three choices, Assessment as a Guide for Learning and Instruction, Assessment as the Basis for Communicating Individual Student Achievement, and Provincial Achievement Testing Program.

The page for Assessment as a Guide for Learning and Instruction states that classroom assessment should have the following characteristics:

> It should be part of instruction and should clearly reveal to students what is expected of them.
>
> It should be an ongoing process rather than a set of isolated events, with the methods and instruments varied, and used in a variety of contexts.
>
> It should focus on a broad range of outcomes, reflecting multiple dimensions of skill development.
>
> The measures should be appropriate to student development and cultural background.
>
> It should be constructive. It should focus on what students can do, clearly identifying both strengths and areas of difficulty. It should encourage improvement in areas of difficulty, linking new learning to what a student already knows and can do.
>
> It should involve students in their own assessment. This gives them responsibility for their own learning and fosters lifelong learning. (Alberta Education, 2005, p. 93)

I find this encouraging, as it seems to correspond with what Bransford et al. (2000) have identified as meaningful assessment activities. After examining the two basic resources made available for the new Grade 7 Social Studies curriculum, I note that there are a wide variety of alternative assessment activities built right into the student texts and others provided for the teacher in their resource manuals.

Parental and Student Support

Finally, a change of this sort needs to be supported by parents and children as well. As Perkins (1991) noted, students indoctrinated in the instructivist paradigm are quite willing to sit back and let the teacher tell them what to do and how to do it. Parents are also sometimes apprehensive about change and express the feeling that "what was good enough for me is good enough for my children". Both parents and children need to understand why a change to active learning that encourages interdependence and student control over their own learning is of benefit.

Other Possibilities

Another possibility for change occurs to me as a result of my experience in Pineview, as well as my experiences with time constraints in Lisa's classroom. Maybe there is a place for the implementation of a Humanities curriculum that would merge Language Arts and Social Studies and allow for the longer time periods that inquiry learning requires. The new social studies curriculum literature review states that "challenge can be accomplished through varying materials and instructional strategies i.e. use of computers, drama, music, art, group and individual work, field trips, guest speakers, games, journals". Many of these activities would dovetail nicely with the idea of a humanities course.

Implications for the new Social Studies Curriculum

What about the implications of constructivism for the new social studies curriculum? In my opinion, the scenario for the constructivist classroom that I described above would dovetail nicely with the new curriculum. As an exercise, I decided to see if the nine elements of constructivist learning I identified in my literature review were mentioned in the curriculum document:

From element 1 (the active construction and reorganization of knowledge) the curriculum states that students should:

> engage in active inquiry and critical and creative thinking; engage in problem solving and conflict resolution with an awareness of the ethical consequences of decision making; conduct research ethically using varied methods and sources;

> organize, interpret and present their findings; and defend their opinions. (Alberta Education, 2006b, p. 2)

From element 3 (prior learning is important in knowledge construction) the curriculum states: "Students bring their own perspectives, cultures and experiences to the social studies classroom. They construct meaning in the context of their lived experience through active inquiry and engagement with their school and community" (Alberta Education, 2006b, p. 5).

From element 4 (learning mediated by artifacts, tools and signs) the curriculum states "Technology encompasses the processes, tools and techniques that alter human activity" (Alberta Education, 2006b, p.10).

From element 5 (learning is a collaborative, social-dialogical activity) the curriculum states that:

> Social participation skills enable students to develop effective relationships with others, to work in cooperative ways toward common goals and to collaborate with others for the well-being of their communities. Students will develop interpersonal skills that focus on cooperation, conflict resolution, consensus building, collaborative decision making, the importance of responsibility and the acceptance of differences. (Alberta Education, 2006b, p.9)

From element 6 (Learning is reflective) the curriculum states that students should "apply skills of metacognition, reflecting on what they have learned and what they need to learn" (Alberta Education, 2006b, p. 2).

From element 7 (multiple perspectives) the curriculum states that students should "appreciate and respect how multiple perspectives, including Aboriginal and Francophone, shape Canada's political, socioeconomic, linguistic and cultural realities" and that they need to "understand historic and contemporary issues, including controversial issues, from multiple perspectives" (Alberta Education, 2006b, p. 2).

From element 9 (learning is internally controlled) the curriculum states that: "the research process develops learners who are independent, self-motivated problem solvers and co-creators of knowledge" (Alberta Education, 2006b, p.10).

The only elements not mentioned in some form in this document are element 2 (learner defines meaning) and element 8 (knowledge is anchored in the context of the learning activity). While it appears that constructivist ideas do play a part in the development of this curriculum, the word constructivism is never mentioned in the curriculum document itself. However, on the Alberta Education website, in the Online Guide to Implementation for Social Studies, the literature review on program foundations mentions constructivism. Under the section entitled *Issues-focused Approach to Teaching Social Studies*, it states

> Meaning is constructed as the individual attempts to make sense of a perplexing situation through reflective thinking and inquiry.
>
> The application of constructivist theory to social studies would result in the development of deep understandings of social studies problems and procedures and rigorously defensible beliefs about important issues in the disciplines.
>
> In social constructivism, the teacher's role as collaborator is to participate with the students in constructing reality by engaging in open-ended inquiry. (Alberta Education, 2006a)

The curriculum document from Alberta Education states:

> Social studies provides opportunities for students to develop the attitudes, skills and knowledge that will enable them to become engaged, active, informed and responsible citizens. Recognition and respect for individual and collective identity is essential in a pluralistic and democratic society. Social studies helps students develop their sense of self and community, encouraging them to affirm their place as citizens in an inclusive, democratic society. (Alberta Education, 2006b, p. 1).
>
> Students become engaged and involved in their communities by asking questions; making connections with their local community; writing letters and articles; sharing ideas and understandings; listening to and collaborating and working with others to design the future; empathizing with the viewpoints and positions of others; and creating new ways to solve problems. (Alberta Education, 2006b, p. 5).

One of the basic resources developed for this new curriculum includes the following explanation:

> The lesson plans and assessment tools in the *Voices and Visions* program support a constructivist, inquiry-based approach to learning. Students both "make meaning" from information presented and assess their work. The program has been designed to meet the curriculum goal of promot[ing] metacognition through *critical reflection questioning, decision making, and consideration of multiple perspectives on issues*.... Students can best succeed in this type of issues-focused curriculum if they are actively engaged in their own learning. (Germain & Scully, 2006, p. v)

As I examine these statements, and others like them throughout the new social studies curriculum and support documents, I see nothing that seems contrary to the ideas about constructivism I have discussed throughout this dissertation. It seems to me that these documents do point the way towards a meaningful experience for students. However, as I explained earlier, it is important that much time is spent exploring the teacher's understanding of what constructivism will mean in his/her classroom. I am heartened to see that several of the supports that I talked about above including resource support and alternative assessment have been put into place to support constructivism in the classroom. However, it is very important to support active strategies to help teachers explore the changes in beliefs that underlie a successful move to a constructivist learning environment. Without the commitment to this philosophy, and an understanding of how to manage the inherent complexity of such an environment, even the provision of resources and assessments that are available will not be enough to effect a change.

Suggestions for future research

As I consider my experiences from this dissertation, a number of ideas come to mind for further exploration. First, since the province is involved in implementing a new social studies curriculum, I think it would be very timely to study what kinds of supports would be needed to help teachers with its implementation. I can envision using developmental research methodology to design and test an online database of classroom examples of constructivist practice throughout the curriculum, supported by small subject level groups of teachers who meet both in person and online to discuss these examples and explore what it means to them. Hopefully it could also incorporate a means to connect experienced constructivist teachers with those unfamiliar with that type of classroom. The research would study several questions. First, would teachers use it? Would the resource act as a catalyst for change in the classroom? Would the development of online community supports help teachers to redefine their teaching by allowing them to explore the meaning of constructivism scaffolded by more experienced peers? Finally, can this form of technologically mediated professional development work, or do we need the face-to-face experience in order to effect change?

Second, I would like to retry the project we designed in a more constructivist setting. Context is very important, as I found when moving from Marie's setting to Lisa's setting. Conducting the research project in a constructivist setting with an experienced social studies teacher would allow the researcher to focus more on research and examine whether some of the variables I have identified, such as role overload, would be mitigated in that setting. Since the resource artifact is completed, this would free up the researcher to attend to other components of the project that received less attention such as an examination of the factors that would facilitate greater student learning. Another interesting question to pursue in the context of a constructivist classroom would be to ascertain what other types of learning, besides historical content, the students acquired as a result of the project. It would be very interesting to pursue questions concerning multiple perspectives, or depth of understanding, as well as any other non-content outcomes such as skills and attitudes that students might exhibit. I think it is important to capture these understandings in a more formal way because the curriculum emphasizes skills and attitudes as important components as well as content. Assessing these other outcomes would give us a more complete picture of what is learned in a project such as this.

Because of the role overload I experienced in the project, and because of the limits of teacher time, I found that I more intuitively than explicitly worked within the framework of the R2D2 model. Another topic I feel would be worthy of further research would be to more comprehensively and explicitly explore the processes in the R2D2 model in order to understand or confirm the utility of this model in developing constructivist learning environments. For example, does the recursive nature of the model contribute to role overload since the developer is constantly redesigning aspects of the project in situ? Does the participatory nature of the model compromise the quality of the final design if the participants' and designer's epistemological stance are not the same? If goals are fluid and are constantly being redesigned within the project, how can we determine success?

Finally, I would like to explore the role of technological mediation in constructivist learning. We know from past research such as the Apple Classroom of Tomorrow (Sandholtz et al.,1997) that technology can change the way students interact and acquire knowledge. From my experience in this project, the availability of reliable technology with accessible tools, such as those available in Marie's classroom, allowed students to work differently within the project and facilitated a more constructivist environment. With the advent of a number of different ways to provide technology to students on a one-to-one basis (Pea & Maldonado, 2006), it would be interesting to explore further, in the context of social studies, what differences would result with accessibility to these tools. Without being drawn into the media debate (Clark, 1994; Kozma, 1994), is there a qualitative difference in the kinds of things that can be accomplished in a classroom with ubiquitous access to technology?

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